

PUBLIC WORKS

Jan.
1951

CITY, COUNTY AND STATE

**erial Surveys Save Time
and Money**

**odern Sewage Treatment
for Summer Resort**

**nall Water Plants—
Water Filtration**

**ontrolling a City's
Atmospheric Pollution**

**ow County Engineers Use
Modern Equipment**

**ow to Take Samples for
Bacterial Analyses**



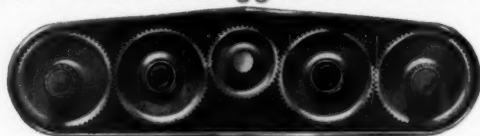
Leaders in the Public Works Field: Jean L. Vincent, Director of Public Works for the County of San Diego, Calif. More data on page 16.

GALION MOTOR GRADERS **have ALL-GEAR TANDEM DRIVE**

*Used successfully
for over 20 years*



The Most Positive & Rugged Tandem Drive Built



STRONG • STURDY • ADJUSTMENT-FREE

Tandem Drive Gears are in **CONSTANT MESH** — eliminating breakage of transmission and final drive parts. Gears operate in oil bath.

Automobiles, Trucks and Crawler Tractors are **GEAR DRIVEN** — *make sure your next tandem drive motor grader is gear driven.*

GALION

ESTABLISHED 1907

MOTOR GRADERS • ROLLERS

THE GALION IRON WORKS & MFG. CO., General and Export Offices — Galion, Ohio, U. S. A.
Cable address: GALIONIRON, Galion, Ohio

MAXIMUM REMOVAL

CLEAN GRIT

NO MECHANISMS

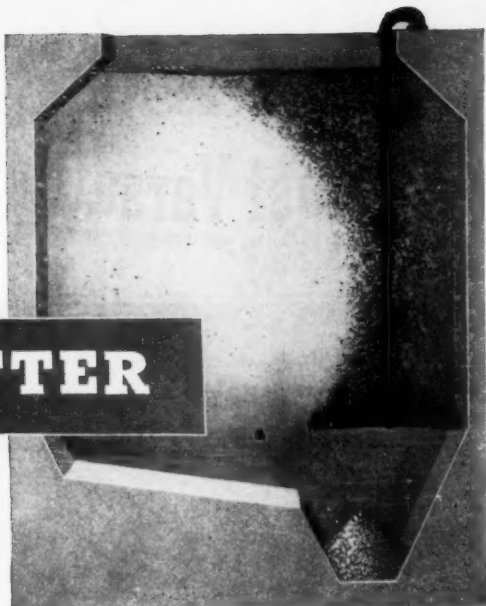
Chicago **AER-DEGRITTER**

AIR CONTROLLED VELOCITIES

INDEPENDENT OF FLOW

LOW COST

SIMPLE STRUCTURE



The 'Chicago' Aer-Degritter now provides the only method of removing grit and sand from sewage without movable mechanical equipment. Air introduced through 'Chicago' Swing Diffusers and Precision Diffuser Tubes controls the velocity of the flow. All sand of 0.2 mm. (65 mesh) and larger is washed and deposited in a hopper at the bottom of the tank.

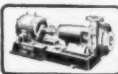
Analysis of grit removed by this system shows less than 10% volatile matter and only a negligible trace of putrescible organics. Because coarse sewage material will not interfere with the operation of the Aer-Degritter and because it does not affect the hydraulic design of the plant, Aer-Degritters may be installed ahead of all mechanical equipment.

'Chicago' Aer-Degritters have been operating successfully at Oildale, California; Columbus, Ohio; Tomah, Wisconsin; and Bellaire, Texas. Additional Aer-Degritters are being installed in Sedalia, Missouri; Ann Arbor, Michigan; Jasper, Indiana; and Fort St. John, B. C., Canada.

CHICAGO PUMP COMPANY **SEWAGE EQUIPMENT DIVISION**

2348 WOLFRAM STREET

Flush Klean, Scrub-Feller, Plunger,
Horizontal and Vertical Non-Clogs
Water Seal Pumping Units, Samplers.



CHICAGO 18, ILLINOIS

Swing Diffusers, Stationary Diffusers,
Mechanical Aerators, Combination
Aerator-Clarifiers, Comminutors.

Now... the Most Versatile Loader on Wheels!

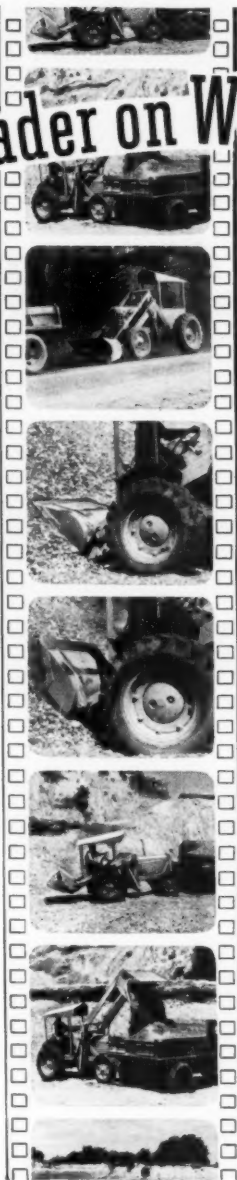


Here's the most versatile, practical loader ever developed for wheel tractors. It can dig in front . . . dump in front like the conventional loader. BUT, it can also dig in *back* and load in *front*.

You can dig in back . . . move straight forward to the truck . . . the bucket swings *straight* over the roof . . . and the load is dumped into the truck. Thus you eliminate the turning necessary with ordinary front end loaders . . . eliminate *half* the gear shifts and *half* the clutch wear. You save time and fuel . . . cut operator fatigue. You speed loader operations . . . can load at better than a yard a minute.

You get far greater traction and almost effortless steering with the Strait-Line. Rear-carried bucket load adds needed weight to the rear driving wheels . . . subtracts weight from the front steering wheels. Increased traction plus the new PUSH-TILT bucket with extended loading lips, enables you to get bigger bucket loads. Two levers control all operations.

Add them all up . . . ability to select your type of digging, front or back as the job requires . . . Strait-Line operation with back digging which gives you faster operation, greater traction and easy steering . . . fuller buckets . . . and you'll see where your operations can profit with the Strait-Line. For information and literature, see your Oliver Industrial Distributor or write direct to The OLIVER Corporation, 19300 Euclid Avenue, Cleveland 17, Ohio.



Conventional front digging, primarily used with Strait-Line where unit digs and moves straight ahead to load.

Back digging. Note how extended loading lips easily penetrate the bank.

PUSH-TILT action which lifts cutting edge 20° and thrusts it into bank.

Carrying position—bucket is tilted to retain load and is carried low enough to increase both traction and stability.

Dumping position. Bucket has been carried over the roof and dumps in front.

THE OLIVER CORPORATION

A complete line of industrial wheel and crawler tractors

"FINEST IN INDUSTRIAL MACHINERY"



The Sign
of
Extra Service



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PUBLIC WORKS Magazine

Edited by W. A. Hardenbergh and A. Prescott Folwell

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THE ENGINEERING AUTHORITY
IN THE CITY-COUNTY FIELD



**PUBLIC WORKS Magazine announces
a special issue in April on**

CIVIL DEFENSE

April, 1951, will be the most important issue of PUBLIC WORKS ever published. It will be devoted entirely to Civil Defense.

A minute's reflection shows Civil Defense is one of the big problems facing America today. All previous world wars were fought on other continents. Now airpower is so advanced that few believe America can escape attack in another world conflict. We all hope there will be no war. But since the decision is not ours alone, war is certainly a possibility. And wise public officials will want to make sure their communities are as well prepared as possible.

Experts predict bombing would bring conditions like these: Hundreds of simultaneous fires, no water, streets blocked by debris, contamination from broken sewers, no communications, thousands of people dead and more thousands buried alive, etc.

What to do . . . How to do it . . . What to do it with

PUBLIC WORKS Civil Defense issue will feature articles by recognized authorities, and by engineers on PUBLIC WORKS' own editorial staff. Here's what they will deal with:

CIVIL DEFENSE ORGANIZATION
AND FUNCTIONS
PLANNING CIVIL DEFENSE FOR
CITIES
MUTUAL AIDS AND SAFE-
GUARDS FOR WATER
SYSTEMS
CIVIL DEFENSE FOR SEWAGE
WORKS
KEEPING HIGHWAYS AND
STREETS OPEN AND USABLE

Other important subjects to be covered are: What to do to insure

most effective use of construction equipment and materials; How to deal with flies and other insects, rats, etc.; Evacuation problems; Health problems in evacuation; Engineering problems in planning housing, both temporary and permanent; Public utilities emergency planning.

Complete, Authoritative, Useful

Like all special issues of PUBLIC WORKS, this will be in great demand. You will want to save and refer to your copy often. If you know others who may want copies of this issue urge them to place their orders now. Paper is short again this year and we cannot print as many extra copies as we would like. Price is \$1. a copy, money back if not entirely satisfied.

**PUBLIC
WORKS**

THE EDITOR'S PAGE



We Need Better Planning for Natural Disasters

During the final week of November, storms struck heavily in many parts of the United States. Ohio and the western Pennsylvania area suffered extremely heavy snowfalls. The Atlantic Coast area suffered (and the word is used advisedly) severe windstorm damage. Granted that the storms were unusually severe, there appears to have been in many communities a lack of adequate advance planning to meet such emergencies. It took 4 to 5 days to restore electric service in sections of northern New Jersey, despite favorable working weather. As of Dec. 2, some of the streets in Pittsburgh were in nearly impassable condition. This office has been pretty well flooded with communications from Cleveland (we published an article describing their planning program for snow removal in our October issue) but most of our correspondents were so wrought up they forgot to date their letters.

Seriously, however, this adds up to the fact that it is time to review our program for coping with natural disasters; and this may well be the first step in civil defense. As to who should do the review, we suggest that the city ask, as a public service, three to five outstanding local engineers, including the city engineer, to form an advisory board. This board should review programs of all local essential utilities. Naturally, they will need to be equipped with information on local resources, given a place to work, and supplied with some clerical and administrative help. The cost, however, will be negligible, and the benefits may be great. Your editor utilized an advisory board of this sort during the war; and more recently he has done the same in connection with his work for New York City. In both cases, the value of the assistance and advice received was almost beyond belief.

Lay That Shotgun Down

In a recent circular letter, one of our larger New York banks calls for retrenchment in the expenditures of states and cities (also the Federal Government). Presumably the National City Bank, the author of this letter, would also include counties in this list. We think this bank, if it means what it says, has adopted a short-sighted and narrow policy.

Through ten years of depression and five years

of war, this nation fell seriously behind in its program of highway construction and maintenance. We presume that it is with the blessing of the bankers that our automobile manufacturers continue to turn out some seven million cars and trucks annually. Or would the bankers reduce the output of motor vehicles to meet our present day road traffic capacity, thus permitting a reduction in highway construction and maintenance costs?

Through the same ten years of depression and five years of war, this nation fell seriously behind in its program of sewage and industrial waste treatment. We believe that our banker friends would object to shutting down those factories which seriously pollute our streams, and to depopulating those cities which have no sewage treatment plants. Doing this would permit a reduction in city budgets for waste disposal.

Again, our communities are short of water. A considerable portion of this shortage is due to the increased demands by industry for water. Would our economically-minded friends wish to shut down these industries so that our cities would not need to spend more money for additional water supplies?

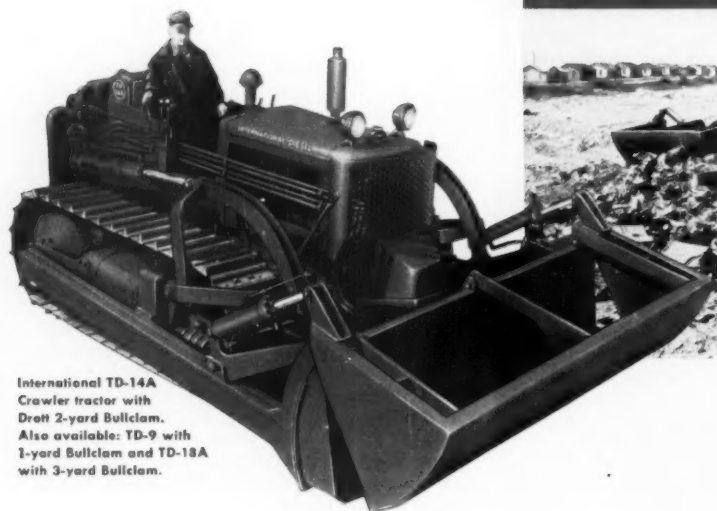
We can continue this discussion to and beyond the point of being tiresome, but there is no reason for doing it. We think that even the National City Bank may acknowledge that it isn't easy, or even possible, to cut down these needed public works expenditures without hurting industry, and seriously. And we suspect they would be among the first to squawk if a city should cut down on the water being sold to an industry to which the bank had made a loan, and this water shortage resulted in operation of the plant at a level that precluded a profit. We think they would squawk also if it were found that poor road conditions so increased the cost of hauling that one of their borrowers was losing money on its operations.

We do not mean to contend that our national budget, and likely also the budgets of many of our other governmental agencies, cannot or should not be reduced. In the course of our prosperity we have allowed ourselves many luxuries which we may have to do without for a while. But all reductions must be based on sound analysis, sound planning and thorough knowledge of actual needs and conditions. A shotgun type of approach toward budget reduction can do much more harm than it can do good. Let's lay that shotgun down.

SAN ANGELO *makes*



Garbage and refuse are compressed in sanitary-4M cans by the grinding, smashing and crushing action of the Bulldozer design—all done solely by a TD-14A tractor-Bulldozer.



International TD-14A
Crawler tractor with
Draft 2-yard Bulldozer.
Also available: TD-9 with
1-yard Bulldozer and TD-18A
with 3-yard Bulldozer.



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WASTELAND Pay-land!

with DROTT-INTERNATIONAL *Sanitary Fill Builder*



Two and a half years ago, San Angelo, Texas, abandoned its incinerator and purchased an International TD-14A crawler and Drott Bullclam to construct and operate a sanitary fill.

Immediate cash savings of \$75 per day were realized, since this one-man sanitary fill builder performs all phases of the operation unassisted and permits short truck hauls.

Of greater and permanent benefit are the abatement of polio hysteria and transformation of ugly pits and gullies into pleasant, useful sites for roadways, parking areas and playgrounds.

"Compaction of the refuse and covering dirt is so complete that little or no settling of the final fill takes place," writes D. W. Cook, superintendent of gar-

bage for the city, in a report published last October.

"Turning wasteland into useful property, increasing land values and at the same time getting rid of garbage at a much lower cost than ever before," he concludes, "is a combination that every city official likes but not often enough enjoys."

Call upon your International Industrial Power Distributor to demonstrate the Drott-International method of refuse disposal—or write to Drott Manufacturing Corporation, Milwaukee 8, Wisconsin, for complete information.

DROTT MANUFACTURING CORPORATION
Milwaukee

INTERNATIONAL HARVESTER COMPANY
Chicago

The tractor-Bullclam unit spreads the dirt layer in layers over the compressed San Angelo trash and garbage, so transporting the dirt, the unit further compacts the fill with every pass.

The same tractor-Bullclam unit grades and finishes the completed sanitary fill, using the blade section of the Bullclam. A feature of the Bullclam is its automatic depth-of-cut control.

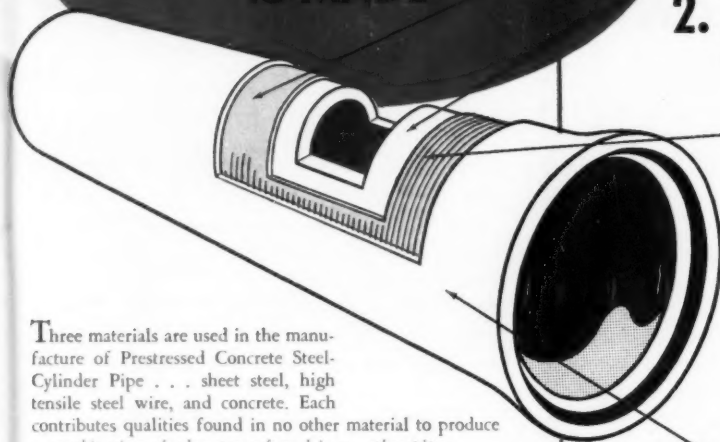


DROTT-INTERNATIONAL

TRACTOR AND BULLCLAM COMBINATION

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HOW Prestressed Concrete Steel-Cylinder Pipe IS MADE



1. A STEEL CYLINDER . . .

is formed and hydrostatically tested up to a tension in the steel of 25,000 psi. (Steel cylinder provides high beam strength and water tightness.)

2. A CONCRETE CORE . . .

is formed inside the steel cylinder. This becomes a structural part of the pipe. (Concrete lining provides initial and continued high rate of flow.)

3. HIGH TENSILE STEEL WIRES . . .

are wound around the steel cylinder and concrete core at constant tension. (Steel wire prestresses steel cylinder and concrete core by compressing them. Compression is relieved as internal water pressure increases, thus permitting high operating pressures without tension in concrete.)

4. A CEMENT MORTAR . . .

encasement provides a permanent exterior jacket. (Mortar has proven the most successful protection against corrosion and electrolytic action.)

Three materials are used in the manufacture of Prestressed Concrete Steel-Cylinder Pipe . . . sheet steel, high tensile steel wire, and concrete. Each contributes qualities found in no other material to produce a combination of advantages found in no other pipe.

This combination produces water pressure pipe that will give the longest trouble-free service at the lowest cost. That's why Prestressed Concrete Steel-Cylinder Pipe was picked for one of America's longest high-pressure water supply lines—the Saginaw-Midland pipe line in Michigan, and for lines in Miami, Fla., Rochester, N. Y. and elsewhere. Prestressed Pipe is manufactured in sizes from 16" up for any pressure common to American water-works practice.

Our engineers know pipe line design and laying problems. Consult them. There will be no obligation.

Price Brothers Company
1767 EAST MONUMENT AVENUE, DAYTON 1, OHIO



Please send me booklets on Prestressed Pipe.

- ☐ Manufacturing and Prestressing
☐ Tapping under Pressure
☐ AWWA Specification No. 78.2-1

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ORGANIZATION _____
ADDRESS _____

1709

Send for these fact-packed booklets on Price Brothers Prestressed Concrete Steel-Cylinder Pipe.

Installing Price Brothers Prestressed Pipe on the 80-mile Saginaw-Midland project, one of America's longest high-pressure water supply pipe lines. Elbows go into line easily and quickly.



Get full details of this month's new products . . . mail your Readers' Service card today.

**Every truck operator
in America
should read the
full story of the —**



NEW FORD TRUCKS for '51

WITH
POWER PILOT



ECONOMY

FORD'S STEP-AHEAD ENGINEERING achieves new economy, new performance. There's a new economy-engineered Ford Truck for your job, or any job. Over 180 models, 95-h.p. Pickups to 145-h.p. BIG JOBS.

Send **COUPON** today for **"WHY IT'S IMPORTANT TO YOU"**

The facts on what the proven Ford Truck Power Pilot is, how it saves you money, how it is different from conventional systems, etc., need more space than we have here.

So does all the news about new 5-STAR Cab comfort, new transmissions, new axle ratios, new pistons and camshafts... the new features throughout the Ford Truck line for '51.

But these are all facts that can mean real dollar savings to you. Mail the attached coupon today.

**Ford Trucking
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Because—**



FORD TRUCKS LAST LONGER!

Using latest registration data on 6,592,000 trucks, life insurance experts prove that Ford Trucks last longer!

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FREE

Send me without cost or obligation, the interesting new leaflet giving full facts on the "Power Pilot," plus specification data on the NEW Ford Trucks for '51 indicated below:

FORD Division of FORD MOTOR COMPANY
3257 Schaefer Rd., Dearborn, Mich.

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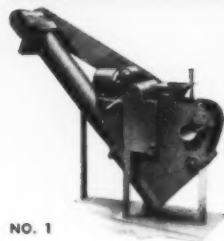
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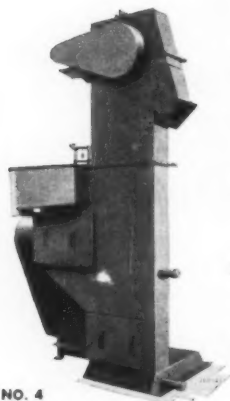
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GRIT WASHING WITH THE JEFFREY JIGRIT

(Reg. U. S. Pat. Off.)



NO. 1

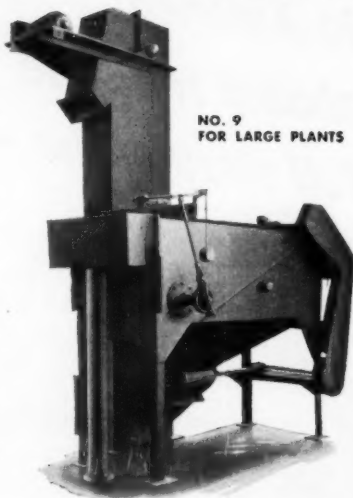


NO. 4

Scrubbing grit, freeing adhering organic solids and rejecting them with the overflow, classifying the products . . . all these can be done efficiently with Jeffrey JIGRIT Washers (Patented), a type and size to meet your need exactly.

It has been shown by field studies that grit should be collected by one mechanism and washed in a separate unit. Jeffrey builds both . . . collectors of the chain and scraper or chain and bucket type, or a combination of the two . . . a series of Grit Washers as shown on this page.

Typical arrangements are available in drawing . . . let us help you select the best means for collecting and removing grit from the channels.

NO. 9
FOR LARGE PLANTS

Other Jeffrey Equipment for Sewage, Water and Industrial Waste Treatment:

Bar and Disc Type Screens
Screenings Grinders
Sludge Collectors
Grit Collectors and Washers

Sludge Elevators
Chains and Sprockets
Chemical Feeders
FLOCTROLS

Garbage Grinders
Scum Removers
Conveyors

Send for Catalog No. 833

	1	4	9
Capacity	20 cu.ft. per hour.	120 cu. ft.	280 cu.ft.
Removes	80% Organics	90%	90%
Recovers	90% Inorganic grit.	90%	90%
Feed Water	15 Gal. per min.	45-70 g.p.m.	100-140 g.p.m.

THE JEFFREY

MANUFACTURING COMPANY

ESTABLISHED 1877

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Complete Line of
Material Handling,
Processing and
Mining Equipment



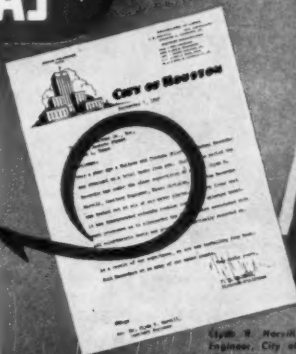
Now's the time to mail this month's Readers' Service card.

THE **W&T** RESIDUAL RECORDER so good they order MORE ..

at HOUSTON, TEXAS

where a W&T Residual Recorder was installed on a trial basis and for several months put through a series of rigorous, exacting tests at six of the Houston Water Plants.

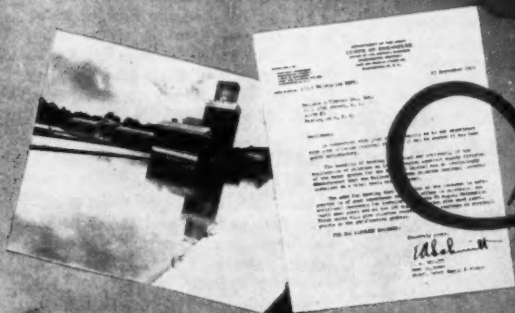
The performance of the Recorder in these tests is described by Mr. E. N. Baldwin, Director of Utilities, who writes in a recent letter "****We have found that it eliminates the inaccuracies associated with all colorimetric tests and provides automatically recorded results for permanent records. As a result of our experience, we are now installing four Residual Recorders at as many of our water plants."



Lydia B. Harris, Secretary
Engineer, City of Houston,
Water Division, points out
a feature of the Recorder.



at WASHINGTON, D.C.



The Dalecarlia Filter Plant where 2
Recorders will soon be operating.

At the 85 mgd Dalecarlia Filter Plant serving the nation's capital, a W&T Residual Recorder was installed to measure the residual of the filter effluent. The results were so effective that Mr. E. A. Schmitt, Head Engineer, Chief of the Water Supply Division writes:

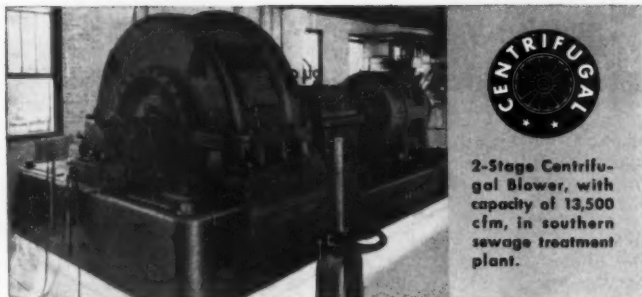
"****The need for knowing that the health of the consumer is safeguarded is of such importance that this office is purchasing six additional recorders for installation at its 85 mgd Dalecarlia rapid sand plant and at the 100 mgd McMillan slow sand plant. These units will give chlorine residual sample readings at strategic points in the purification process."

All the advantages of residual recording such as improved chlorine usage, better chlorination control and smoother plant operation typified by these and other installations at Cleveland, Richmond, Kansas City, and Atlanta can be obtained for your plant too. Just call your nearest W&T Representative for full details today.

S-53

WALLACE & TIERNAN COMPANY, INC.

CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES



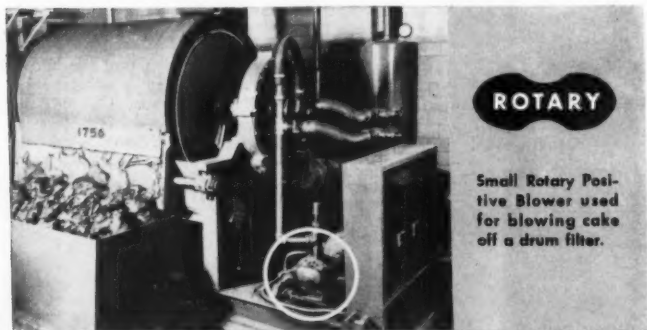
2-Stage Centrifugal Blower, with capacity of 13,500 cfm, in southern sewage treatment plant.

The superintendent of a large sewage treatment plant made this friendly statement to a Roots-Connorsville representative. What he really meant was that R-C Blowers and related equipment perform so satisfactorily and dependably that they seldom need anything more than routine inspection by his own men.

In large and small plants—for metropolitan areas, rural villages or industrial sewage treatment—R-C products uniformly give this kind of reliable operation. They continue to deliver rated capacities, year after year, with a minimum of maintenance—whether a small Rotary Positive Blower of 5 cfm capacity or a Centrifugal unit moving up to 100,000 cfm.

If you are planning a new plant, expansion, or replacements, R-C engineers will work with you to select the equipment best fitted to your needs. Almost a century of experience is at your service.

ROOTS-CONNORSVILLE BLOWER CORPORATION
151 Poplar Avenue, Connorsville, Indiana



ROTARY

Small Rotary Positive Blower used for blowing cake off a drum filter.

ROOTS-CONNORSVILLE

ONE OF THE DRESSER INDUSTRIES



BOOKS IN BRIEF

ECONOMICS & PUBLIC UTILITIES

This book is devoted largely to a discussion of the financial management and operation of public utilities, including regulation, finance, valuation, rate of return, accounting and rate-making techniques. There is a complete bibliography and a table of cases. 741 pages. By Eli Winston Clemens, University of Maryland. Appleton-Century-Crofts, Inc., New York. \$5.75.

OIL PIPE LINE BREAKS

Recommended practices to prevent stream pollution from oil pipeline breaks are described in some detail. Included are methods of minimizing breaks, organization and training of emergency crews, and how to handle the oil. 22 pages. Sent on request to E. J. Cleary, Executive Director & Chief Engineer, Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio.

IRRIGATION PRINCIPLES

This is a second edition and it brings to the reader the progress in this field since 1932. Features of this book are the new material on drainage, data on the flow of water in soils, and data on water allotments. An excellent book. By O. W. Isrealson, Utah State Agricultural College. John Wiley & Sons, Inc., N. Y. 381 pages; 181 ills. \$6.

TRANSIT & TRAFFIC CONTROL

Municipal control of mass transportation and general street traffic should be combined under a single administrative agency. This book covers standards of service and fares, modernization factors, the use of buses, comprehensive traffic planning and municipal control and management. By John Bauer and Peter Costello. Public Administration Service, Chicago, Ill. 268 pages. \$5.

TRAFFIC ENGRG HANDBOOK

This handbook collects in one volume basic engineering data as a guide to practice, and is intended to be a day-to-day reference book for those engaged in traffic and

New tool for higher production

→ "CATERPILLAR" MOTOR GRADER
→ PLUS DOMOR ELEVATOR
ATTACHMENT IS
ONE-MAN ELEVATING GRADER



Now the versatile "Cat" Motor Grader becomes more useful than ever. With the new DoMor Elevating Grader Attachment, it offers you a tool for faster, more economical casting and loading. In actual use, this unit has already proved itself a production booster and money saver on construction and maintenance of farm-to-market roads.

Here's one example. Otter-Tail County, Minn., experienced occasional road block-outs during ordinary snows. To remedy this condition, Wendell P. Huber, County Engineer, finds the "Caterpillar"-DoMor unit an ideal tool. Here you see it casting up and ditching to eliminate snow traps on a road 10 miles east of Pelican Rapids. Production averages $\frac{1}{3}$ to $\frac{1}{2}$ mile per day—and its sturdy build keeps it on the job day after day.

For full information about this efficient new tool, see your "Caterpillar" dealer. With the increasing use of "Caterpillar" equipment both for military needs and for maintaining civilian economy, it's a good move to see him today. Talk over your requirements with him! He has a complete stock of parts to keep your present equipment in running order and will do his utmost to make prompt delivery of new machines.

CATERPILLAR, PEORIA, ILLINOIS

FAST FACTS

- ★ The DoMor Elevating Grader Attachment works with "Cat" No. 12 or No. 112 Motor Graders.
- ★ One-man operation from the operator's seat. Regular blade controls operate grader actions.
- ★ 30-inch plowing disk cuts furrow just outside the wheel line. Leaning front wheels counteract side draft.
- ★ Big-capacity 42-inch carrier runs at 400 ft. per minute.
- ★ Conversion from Motor Grader to Elevating Grader and vice versa gives you a double-purpose unit.

CATERPILLAR

DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

Only genuine **RIGID** guarantees economy



• You'll find no substitute for the smart-working long-lasting qualities that have made the **RIGID** the world's most popular pipe wrench. Breakproof housing, full-floating hookjaw with handy pipe scale, replaceable heeljaw, adjusting nut that spins easily in all sizes, 6" to 60", comfort-grip handle—these plus the **RIGID** name mean more service and tool satisfaction for your money. Buy at your Supply House.

RIGID

★ **Work-Saver Pipe Tools** ★

Thousands use our Readers' Service card to keep up to date . . . do you?

transportation problems. The editor is Henry K. Evans; 16 nationally known traffic engineers participated in the actual writing. Institute of Traffic Engineers, New Haven, Conn. 497 pages. \$6.

PUBLIC WORKS ADMINISTRATION

The fourth edition of this book is just out. Prepared by men thoroughly experienced in the public works field, it is not designed to train the reader as an engineer, but to acquaint him with the management functions and efficient operating techniques of a public works department. 458 pages. International City Managers' Ass'n., Chicago 37, Ill. \$7.50.

LEADERS IN PUBLIC WORKS

Jean Vincenz, shown on this month's front cover, is Director of the San Diego Co. Dept. of Public Works, which includes responsibility for 7 airports, for county building inspection, for 43 parks and beaches, and for servicing and maintenance of 10 sanitation and 26 lighting districts, plus all normal public works functions.

A Lieutenant Colonel in the office of the Chief of Engineers during the war, he was in charge of maintenance, repair and minor new construction of all buildings, roads and grounds, and operation of all utilities for installations in the ZI. Before the war, he pioneered (when he was Director of Public Works, City Engineer and Manager of Municipally-Owned Utilities in Fresno) the sanitary fill method of refuse disposal; and he applied this experience with remarkable results to Army problems of waste disposal. He has long been active in the APWA.

He is a civil engineering graduate of Stanford, 1918; a member of the ASCE; and a registered civil engineer in California. He is married and has three daughters and his hobbies are athletics and music. One of his major trials as an Army officer was that he had to learn to wear a hat.



Install Wolverine Copper Water Tube *-to be sure*

Whenever you leave a job where you have just installed Wolverine copper tube you will always have a feeling of self satisfaction as well as customer satisfaction.

You can be sure you have given your customer the best tubing that skilled workmanship and many years of exclusive tube-building can produce.

You may recall how easy it was to install (it bent so easily). You might remember, too, that the coil came to you carefully packed in a carton legibly marked for size, etc. And when you cut

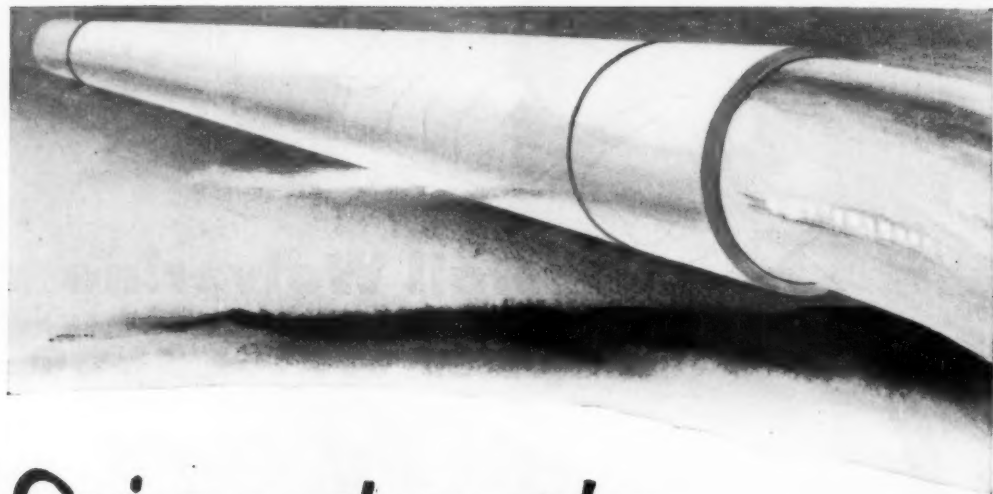
off the length you needed for the job, you replaced the unused portion in the strong carton that would protect it against possible damage until you wanted it again.

You'll say to yourself: "I keep my customers by giving them good workmanship; and whenever copper water tubing is required, I install Wolverine, the quality-controlled tube." **WOLVERINE TUBE DIVISION, Calumet & Hecla Consolidated Copper Company, Incorporated. Manufacturers of Seamless, Non-Ferrous Tubing. 1451 CENTRAL AVENUE, DETROIT 9, MICH. Plants at Detroit, Mich., and Decatur, Ala.**



Buy From Your Wholesaler

Now's the time to mail this month's Readers' Service card.



Saving precious water **for a thirsty**

Municipal consumption of water in the United States has risen from two billion to over twelve billion gallons per day in the last fifty years.

In many areas, this rapid increase is posing a serious problem. It means that water supplies must be conserved to the limit if they are to continue to meet an ever-growing demand.

It is not surprising, therefore, that more and more water-works officials are seeking ways to cut down on water losses as one practical step toward the solution of this problem.

Since recent studies indicate that many localities are losing as much as 10% of water pumped because of underground leakage, an important question to be answered in any water conservation program is this: "How can I plan to reduce this major cause of water loss to a minimum?"

Community after community has found the answer in Transite Pressure Pipe.

The unusual success of Transite Pipe in combatting underground water losses is due to a combination of two factors: (1) the design of the Simplex Coupling used for assembly, and (2) the ability of the pipe to maintain its strength in service.

Because flexibility is engineered into the Simplex Coupling, this factory-made joint is virtually unaffected by pipe line stresses that so often result in the loosening and failure of conventional type joints. No particular skill is required for its proper assembly, which is readily checked in the trench by means of a simple gauge immediately after the pipe ends are joined.

Moreover, Transite's maintained strength provides a further safeguard against costly underground water losses. In thousands of installations representing a wide variety of municipal soils, this asbestos-cement pipe has proved its exceptional ability to resist corrosion . . . to maintain its strength under conditions which have seriously impaired the structural integrity of other pipe materials.

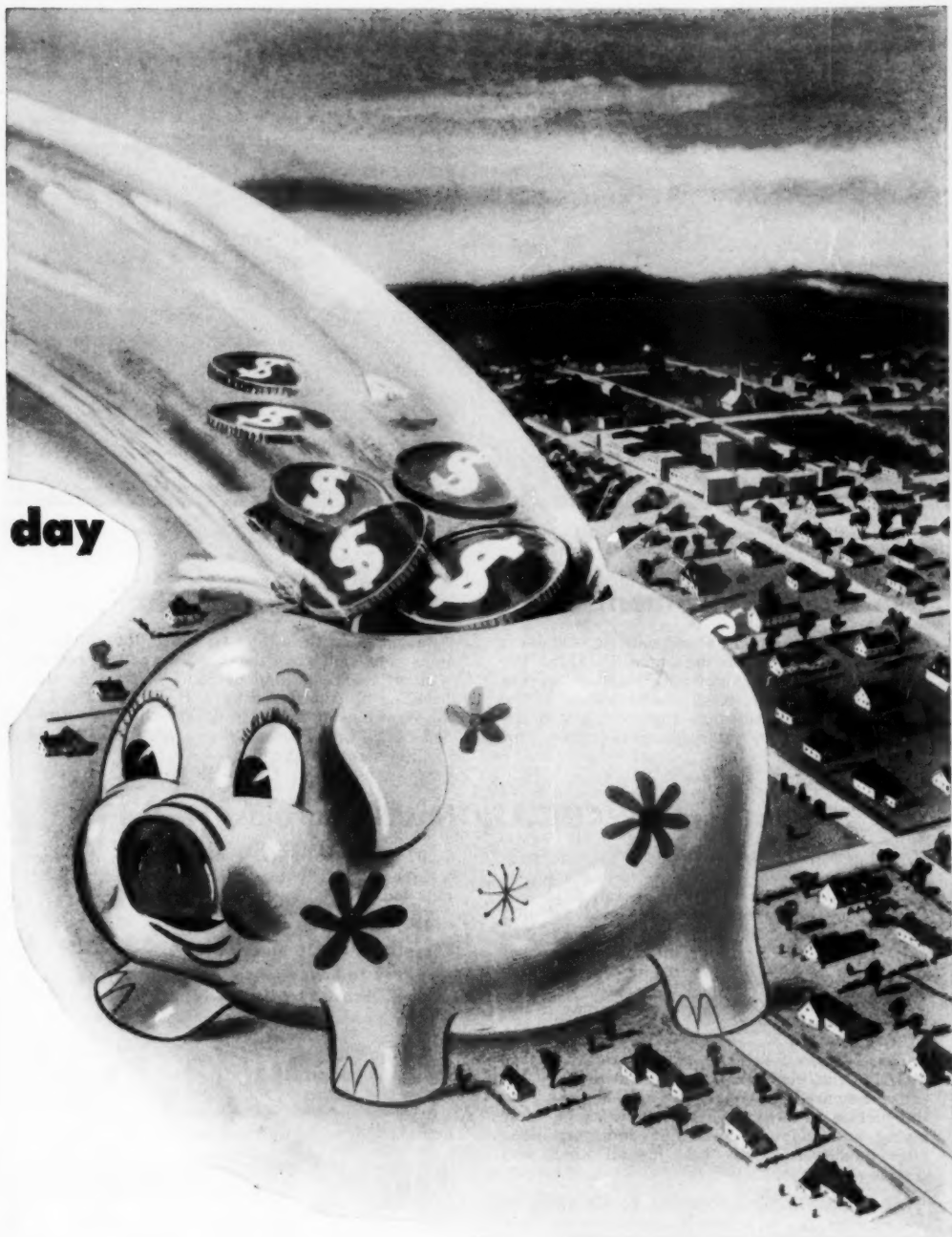
Reducing the amount of "water pumped but not paid for" on your books—a saving in dollars as well as water—is only one of many important economies which Transite Pipe can offer you. Savings on installation, savings on pumping costs, savings on maintenance . . . these are further sound reasons why you will want all the facts about this modern asbestos-cement pipe developed and produced by Johns-Manville to carry water more efficiently.

For complete information write Johns-Manville, Box 290, New York 16, N.Y.



Johns - Manville

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

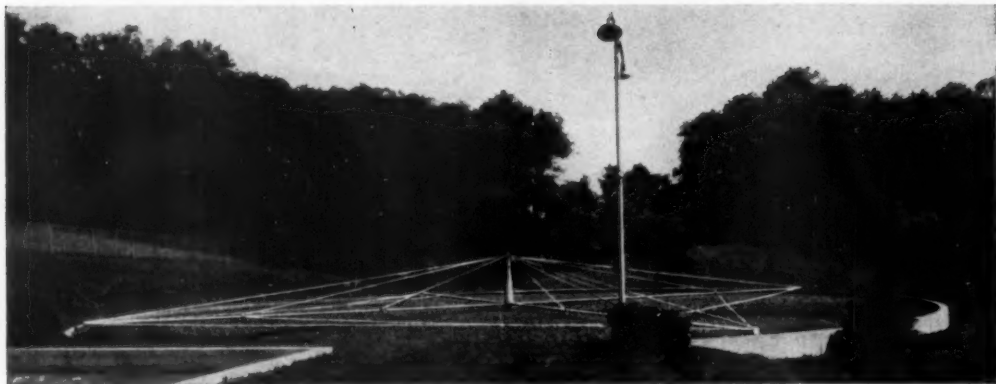


TRANSITE PRESSURE PIPE

Transite is a registered Johns-Manville trade mark

Need more facts about advertised products? Mail your Readers' Service card now.

For Better Trickling Filter Results



YEOMANS rotary distributor at Westminster, Md. J. B. Ferguson & Co. of Hagerstown were the Consulting Engineers and Ligon & Ligon of Baltimore the Contractors.

Use Good Equipment

Its adherence to highest engineering standards for 53 years has made the name "YEOMANS" on trickling filter equipment a mark of quality and dependability. A basic understanding of the fundamental necessities in engineering and design goes into every rotary distributor they produce.

And yet even these fine trickling filter installations will not give the best operating results without the right kind of floor. That's why this trickling filter designed by J. B. Ferguson & Co. for Westminster has a *specification floor* of *Vitrified Clay Filter Bottom Blocks* . . . the best kind of filter floor obtainable.

Use TFF Institute SPECIFICATION Underdrains

Trickling Filter Floor Institute *specification* underdrains are used in all modern filters where better results and trouble-free operation are desired. They are scientifically designed for that purpose and made of the finest quality vitrified clay. The size of the top openings insures proper ventilation of all the filter media and free discharge of the filter effluent. The run-off channels are extra smooth for non-clogging, quick drainage.

These blocks will carry applications up to 50 MGAD. Unskilled labor can lay them easily because they are light-weight and self-aligning. And the blocks are strong enough to work on after laying and to support safely even very deep filter media. They are best for all kinds and shapes of filter.

On *your* next filter, use the best equipment you can get . . . and give it a *specification floor*

of *Vitrified Clay Filter Bottom Blocks*. Ask any member of this Institute for full engineering details today.

These **ONE-PIECE** blocks are:

Easy to Lay Acid Resistant
Proved by Use Won't Clog



Bosco



Natco



Armco



Translot



Pomona



Dickey

TRICKLING FILTER FLOOR INSTITUTE

Ayer-McCarrel-Reagan Clay Co. National Fireproofing Corp. Bowerston Shale Co. Pomona Terra-Cotta Co. Texas Vitrified Pipe Co. W. S. Dickey Clay Mfg. Co.
Brazil, Ind. Pittsburgh 22, Pa. Bowerston, Ohio Pomona, N. C. Mineral Wells, Tex. Kansas City 6, Mo.

Get full details of this month's new products . . . mail your Readers' Service card today.



750,000 Gallons of EVIDENCE

Here, in the South Dakota's largest city, is new evidence of how a progressive municipality provides water for its growing population.

The 750,000-gallon Horton elevated water tank pictured above is part of a program designed to satisfy the demands of 52,161 people in Sioux Falls. In large cities, low pressures and violent pressure fluctuations often create unsatisfactory water service. Consumers living in outlying sec-

tions suffer unless definite steps are taken to make the necessary improvements promptly.

Horton tanks with radial-cone bottoms are especially designed for this purpose. Their unique construction enables them to be built in capacities from 500,000 to 3,000,000 gallons with a relatively low range in head. This means more uniform water pressures and lower pumping costs.

Write our nearest office for information.

HORTON

STEEL STORAGE TANKS
...for municipal service

CHICAGO BRIDGE & IRON COMPANY

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

Atlanta 3.....	2123 Healey Bldg.	Los Angeles 14	1500 General Petroleum Bldg.
Birmingham 1.....	1532 North Fifth St.	New York 6.....	2316-165 Broadway Bldg.
Boston 10.....	1038-201 Devonshire St.	Philadelphia 3.....	1648-1700 Walnut St. Bldg.
Chicago 4.....	2115 McCormick Bldg.	Salt Lake City 4.....	539 West 17th South St.
Cleveland 15.....	2221 Guildhall Bldg.	San Francisco 4.....	1525-200 Bush St. Bldg.
Detroit 26.....	1536 Lafayette Bldg.	Seattle 1.....	1329 Henry Bldg.
Houston 2.....	2142 National Standard Bldg.	Tulsa 3.....	1641 Hunt Bldg.

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Dependable CLEVELANDS

—your best investment
for trenching profits



Your best investment because CLEVELANDS cut your machine expense. Records over 30 years have established CLEVELANDS lower operating and maintenance costs. Their longer service life is proved by the high percentage of early CLEVELANDS still in daily use. And their versatility and wide range of trench sizes cover your jobs more efficiently with fewer machines. Your best investment because CLEVELANDS give you more trench for your money. Advanced engineering gives faster cutting capacity. Compact design allows work among the tightest obstructions. And quick, easy mobility saves time lost between jobs. To all this add the rugged CLEVELAND dependability that turns shop time into job time and lets you tackle the toughest soil and terrain on a year 'round basis. Call your local distributor or write direct for full details on "your best investment—for trenching profits."

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE

CLEVELAND 17, OHIO



Now's the time to mail this month's Readers' Service card.

Meter Costs in St. Paul

According to the latest biennial report of the Board of Water Commissioners of St. Paul, Minn., 4,841 $\frac{3}{8}$ " to 2" meters were disconnected at an average cost of \$1.10; 4,800 were reset at an average cost of \$1.13; 5,287 were repaired at an average cost of \$5.73. Of the 4,841 disconnected, 38.1% had stopped; 12.4% because of sand; 12.2% because of defects; 10.8% were burnt; and 2.7% frozen. In 10.5% the register was defective; 25.5% were leaking; 1.3% were noisy. The remainder were removed for testing, service shut off or other cause not due to unsatisfactory condition of the meter.

The cost of meter maintenance per meter per year, averaging "a period of years," was 15.26¢ for $\frac{3}{8}$ " meters with an average life of 27½ years; 12.41¢ for $\frac{3}{8}$ " x $\frac{3}{4}$ " meters with an average life of 18 years; 17¢ for $\frac{3}{4}$ " meters with an average life of 10½ years; 18.05¢ for 1" meters with an average life of 16 years; 27.66¢ for 1¼" meters with an average life of 30 years; 25.57¢ for 1½" meters with an average life of 20 years; and 49.88¢ for 2" meters with an average life of 24 years.

Testing 2,339 meters cost \$396.73, of which \$76.48 was charged to overhead, \$314.76 to labor, \$2.81 to material and \$2.68 to tools and equipment. Installing 1,494 meters cost \$2,402.

City Adopts Annexation Policies

Boulder, Colorado, has established basic policies for the annexation of fringe areas and adopted subdivision regulations governing real estate development. The annexation policies are based on four general principles: (1) Annexations should be general and not based solely on the presence or absence of public facilities. (2) The city must accept leadership and responsibility in working out fringe area problems. (3) Annexation should be undertaken when the fringe is becoming urbanized and before it is substantially developed. (4) Annexations should conform to the financial ability of the city to provide municipal services. The newly adopted subdivision regulations set forth standards governing the layout of streets, alleys, blocks and lots; establish minimum areas for subdivision; require conformity to zoning standards; and require, before acceptance by the city, that the subdivider install street and utility improvements or post a bond equivalent to the cost of installing utilities.—Public Management

WITH EACH SEASON'S PASSING

THIS ROAD GIVES BETTER SERVICE . . .



Blending with every landscape and free from glare, roads built with Tarvia* road tar take the strain out of driving. They are self-healing under impacting traffic.



The heat-absorbing qualities of black roads built with Tarvia* road tar make them easier to keep open in winter as snow and ice melt more quickly. And they are not affected by chemicals used to remove snow and ice.

Because

- 1 Roads built with Tarvia* road tar improve with age. Occasional applications will renew the life of the surface, and replace worn-away material.
- 2 TARVIA road tar penetrates surfaces and binds together the underlying material. It thus makes possible the inexpensive use of local aggregates.
- 3 Less TARVIA road tar is required because there are less solvents to be evaporated before the binder becomes effective.
- 4 TARVIA road tar is unaffected by gasoline, kerosene, or moisture. It retains its original properties.
- 5 TARVIA road tar holds the aggregate tightly in the surface, and produces a gritty surface which is lastingly skid-resistant.
- 6 TARVIA road tar may be applied at moderate temperatures, and with ordinary equipment.

The Barrett field man is always at your call for expert practical advice.



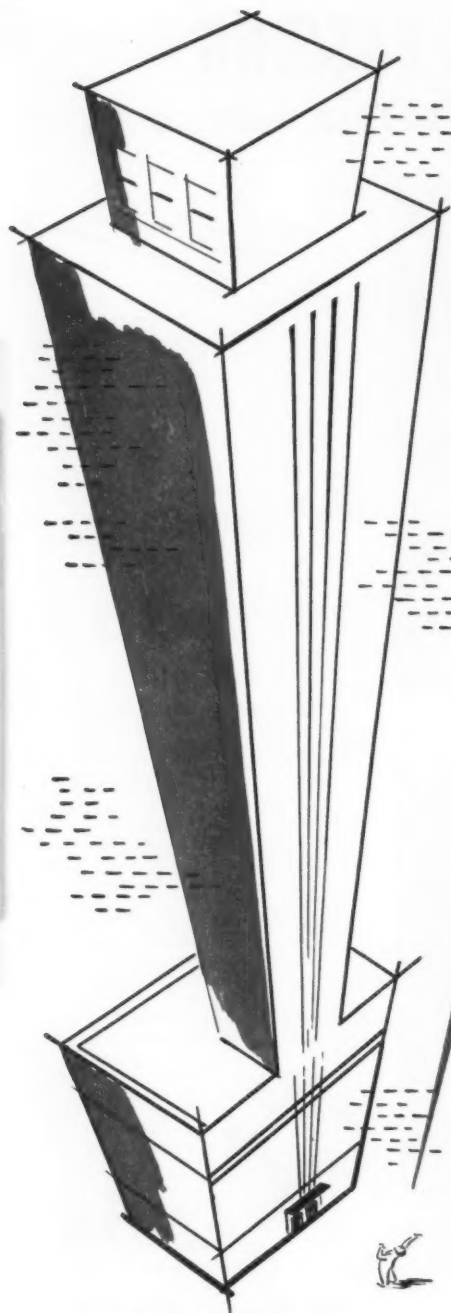
THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

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A non-profit organization representing all phases of advertising
dedicated to the use of advertising in public service.
25 West 45th St., New York 19, N. Y.

GOSH

it wasn't even
here this morning

Now, w-a-i-t a minute! That's going a little too far. Maybe we do perform industrial miracles in this America of ours, but we haven't gotten around to putting up skyscrapers in *one* working day—not yet anyhow. But we're doing things almost as miraculous as that.

Automobiles, radios, television sets, washing machines and so many other wonderful things are pouring off our production lines by the thousands—daily.

Never before in the history of the world have so many labor-saving, time-saving, miracle-working devices been made for the comfort and convenience of any people.

How do we do it? Easy!

We do it simply by a unique combination of qualities that make our nation the most productive of any country on earth. We do it with a system built on our solid faith and belief in the dignity of the individual.

We haven't reached a state of perfection yet. We probably never shall. But we've been getting better and better and better all the time. While we've been making all of these wonderful things, we've been working progressively shorter hours, earning more money, living better and decreasing the cost of production so that prices can go down.

Our American system is the best, the most thrilling, ever devised. With even better teamwork, the future is unlimited. If you want to help make that future, join with The Advertising Council in explaining the American economic system to your employees.

Order copies of the booklet "The Miracle of America" which explains clearly and simply how a still better living can be had for all if we all work together. See that each of your employees receives one of these copies.

Let's show the world what Americans can do when they really try.

WANT TO HELP? MAIL THIS

The Advertising Council, Inc. Dept. B
25 West 45th St., New York 19, N. Y.

Please send me prices on _____ copies of "The Miracle of America", so that each of my employees may receive one.

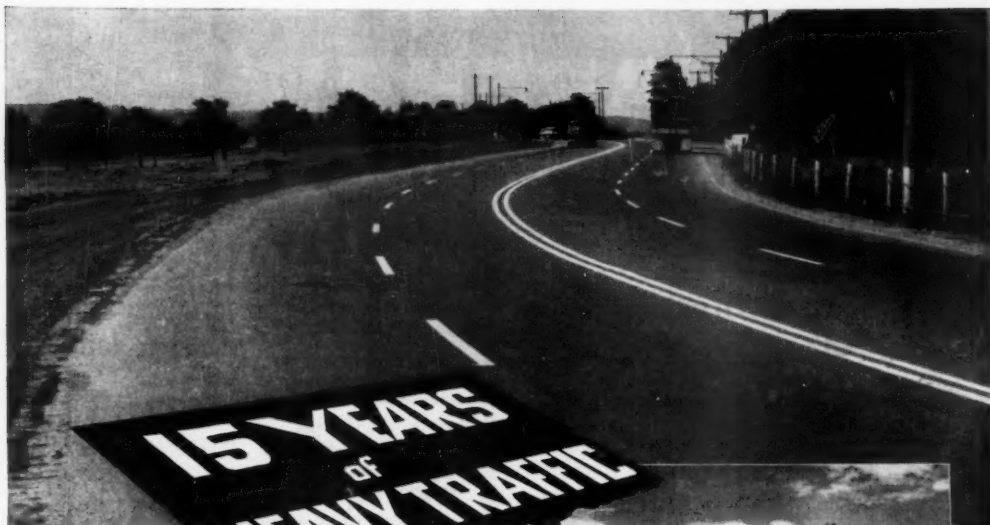
Name _____

Company _____

Address _____



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ADNUN ROADS

are long life roads...

THE best testimonial to Adnun design is the excellent condition of the miles of Adnun laid roads that have carried 15 to 16 years of heavy traffic. The oldest machine laid roads in the world are Adnun Roads. Look at the heavily traveled highway above—a part of the Hamilton-Brantford road in Ontario, one of Canada's main arteries—laid in 1936. The one below—Colorado Blvd.—one of Denver's well known streets laid in 1935. And the bottom picture—part of the Indianapolis Speedway laid in 1936.

These are but a few of many photographs in our files that show prominent traffic arteries in city, state and county systems. These are roadways that bear heavy traffic counts: Streets that take the beating of trucking and speed under a full range of weather conditions. Note the evenness of wear *clear across*, the few signs of patching, the freedom from breakdown.

The Adnun principle of continuous Course Correction assures surface smoothness and a uniformity of course thickness that no other paver can equal. The Oscillating Cutter Bar action cuts the material off at the proper level and does not tear it. Material is carried up to the parallel course and is compacted in place, making a tight joint, a joint that will not throw a car off its course. *The Adnun builds longer life roads and safer roads.*

You will be interested in the booklet, "11 Basic Things." It will give you some new thinking on black top paving equipment. Send for it.

THE FOOTE COMPANY, INC.

Subsidiary of Blaw-Knox Co.
1954 State Street Nunda, New York

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER



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supplies Industry with



**Electroplating Salts
Anodes & Processes**



**Synthetic
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**Driers
and Metal Soaps**



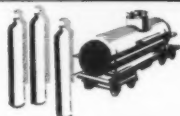
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**Preformed Catalysts
AND
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FOR PETROLEUM AND
OTHER ORGANIC PROCESSES**



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Supplies chemicals
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HOW TO PAVE A MILE A DAY!

Last summer the City of Baltimore, Maryland found it necessary to repave 14 blocks of busy Baltimore Street and awarded the contract to P. Flanigan & Sons Co., Inc. When the city fathers expressed concern over interruption to traffic while work was in progress on this vital city artery, there occurred an outstanding example of what can happen when civic minded contractors get together. The Flanigans conferred with six of Baltimore's leading contractors with the result that, on a single work-packed Sunday, all seven contractors combined to pave fourteen city blocks. Over a mile in length, the work took place between Fremont Avenue and Calvert Street. Twenty-five thousand square yards of asphaltic binder and topping were put down in sixteen hours of continuous operation. With the exception of the motor trucks needed to haul surfacing materials, more rollers were required than any other

type of equipment on the job. Of the eighteen tandems employed, twelve were Buffalo-Springfields. This heavy Buffalo-Springfield preference is best expressed in the words of Mr. Pierce Flanigan:

"On a job like this, dependability is what counts and that's why we've used Buffalo-Springfield Rollers exclusively for the past forty-odd years. Our operators like them and we appreciate their low operating and maintenance costs."

Preference based on actual field experience is predominantly a Buffalo-Springfield success story—and one worth remembering when determining your roller needs for the work ahead. Your nearest distributor will be happy to tell you about the many exclusive features of the Buffalo-Springfield Heavy Duty Tandems—features that will help you in trimming costs and increasing production on all your jobs. Why not see him today?

PLAN OF WORK

National Paving & Contracting,
Fremont to Pine Street
Baltimore Asphalt Block & Tile
Pine to Pearl Street
Mahoney Brothers
Pearl to Paca Street
Potts & Callahan,
Paca to Howard Street
American Paving & Contracting,
Howard to Sharp Street
P. Flanigan, Sharp to Charles Street
Arundel Construction,
Charles to Calvert Street

BILL OF EQUIPMENT

7 asphalt mixing plants
10 asphalt finishers
*18 rollers (8 to 12 tons)
9 air compressors
7 asphalt spray machines
103 motor trucks

*12 of 18 rollers used on record breaking project in Baltimore were Buffalo-Springfields.

BUFFALO  SPRINGFIELD
SPRINGFIELD, OHIO

MAIL THIS COUPON TODAY
THE BUFFALO-SPRINGFIELD ROLLER CO.
Dept. G-1, Springfield, Ohio

☐ Please send me Catalog S35-49 describing the right model for my requirements. ☐ Notify Distributor to call.

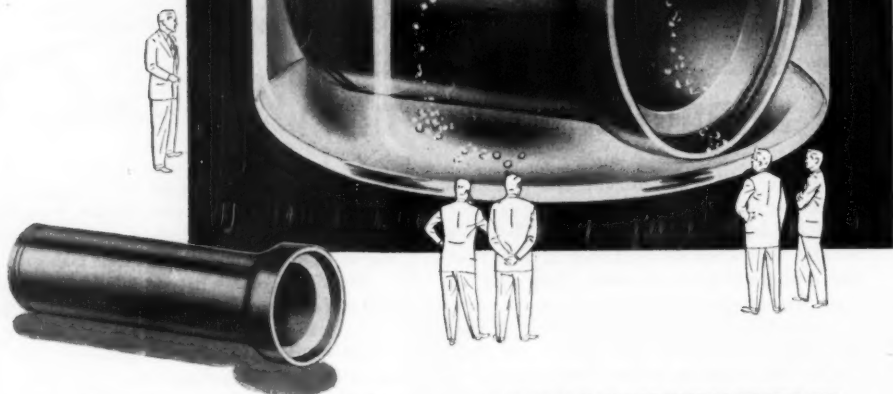
NAME

ADDRESS

CITY STATE

Now's the time to mail this month's Readers' Service card.

acids don't
affect
CLAY PIPE




Only *one* sewerage and drainage material is completely safe from chemical attack—particularly in industrial areas, where factories discharge heavy concentrations of acids and alkalis. Clay Pipe won't corrode, decompose, or disintegrate, because it's *all pure material*, chemically inert, and strengthened by vitrification. It provides *complete* protection against chemical activity—tomorrow, or fifty years from now. Be sure to specify Vitrified Clay Pipe . . . the *only* pipe that never wears out.

NATIONAL CLAY PIPE MANUFACTURERS, INC.

100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
204 Connally Bldg., Atlanta 3, Ga.
701 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

SPECIFY

Vitrified
CLAY

PIPE



WRITE FOR DETAILED INFORMATION

Additional information and data on Vitrified Clay Pipe and Clay Building Products will be sent on request. State your specific questions. Simply contact the regional office nearest you.

C-151-B

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

An Important Message for Everyone Who Buys Sewage Treatment Equipment

From Single Items To Complete Sewage Treatment Plants INFILCO Equipment Can Fill ALL Your Needs

Thinking about replacing old equipment or modernizing and increasing the capacity of a sewage treating plant? INFILCO can provide a complete range of equipment and control devices from which to choose.

Planning an entirely new plant? INFILCO offers you the advantage of a one-source supply for all your needs. Whether your plans call for chemical or biological treatment, you can depend upon INFILCO for the most modern equipment available...equipment that will be modern for years to come!

A complete laboratory and staff of competent engineers are available for making recommendations and reports.

When considering your next sewage treatment plant or the modernization of an existing plant—consider the advantages of Infilco Service and Equipment. The Infilco Field Engineer is only a telephone call away. Consult your Classified Directory or write our executive offices in Tucson.

SEND FOR 8-page Bulletin No. 60-C. It contains illustrated descriptions covering the many superior advantages of Infilco Sewage Treatment Equipment.

SERVING MUNICIPALITIES WITH SEWAGE TREATMENT EQUIPMENT THAT'S

*Quality Engineered for
Quality Performance*

INFILCO INC.

NEW YORK 17 • TUCSON • CHICAGO 16

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

PRECISION ENGINEERED INFILCO SEWAGE TREATMENT EQUIPMENT

Accelerator®
Accelo-Biox®
Accelo® Filter
Accelo Hi-Cap® Filter Underdrain
Aero-spray Nozzles
Aero-Accelator
Automatic Dosing Siphons
Chemical Feeders
Clarifiers & Automatic Skimmers
Coagulators
Combination Grease & Grit Remover
Cyclator®
Digesters
Griductor®
Daytona Beach Process Plant
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Sewage Samplers
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Vorti-Mix Aerators



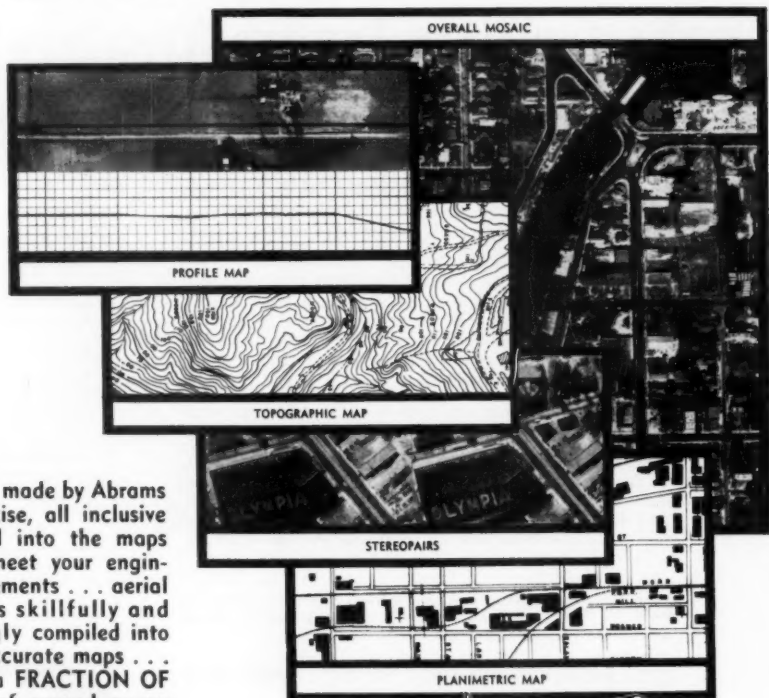
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Aerial surveys made by Abrams give you precise, all inclusive detail plotted into the maps selected to meet your engineering requirements . . . aerial photographs skillfully and painstakingly compiled into thoroughly accurate maps . . . and at only a FRACTION OF THE COST of ground survey methods. Write today for your free copy of "AERIAL SURVEYS AND MAPS FROM PHOTOGRAPHS."



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**ABRAMS AERIAL SURVEY
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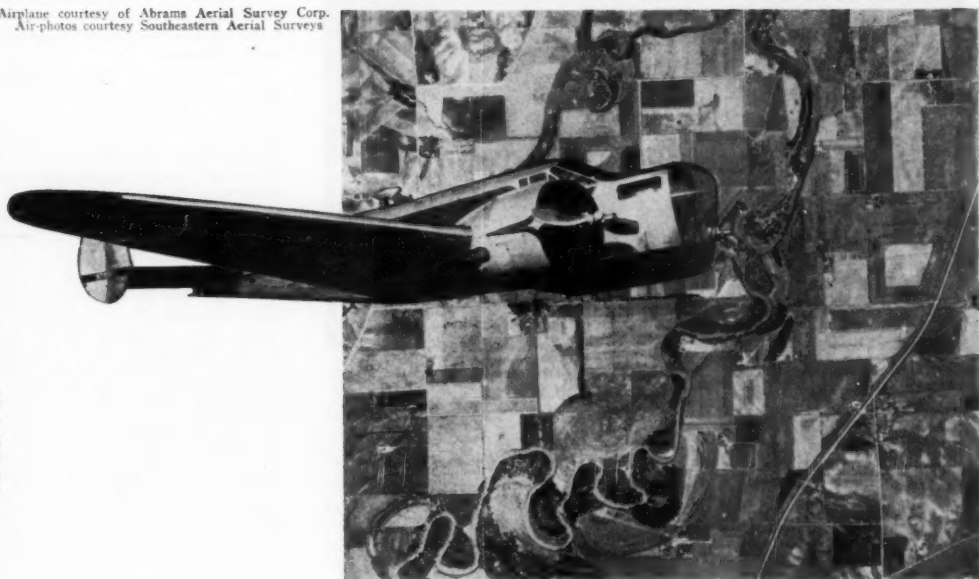
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PUBLIC WORKS Magazine

VOLUME 82 • No. 1

JANUARY, 1951

Airplane courtesy of Abrams Aerial Survey Corp.
Air-photos courtesy Southeastern Aerial Surveys



• *THE amount of time saved by using aerial surveys varies with the size and complexity of the area to be surveyed.*

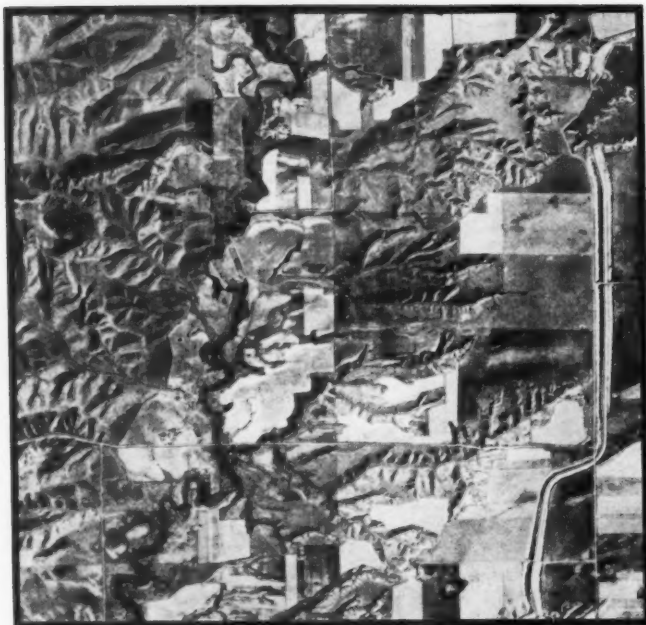
AERIAL SURVEYS SAVE TIME and MONEY

AERIAL photographs are used by Limestone Co., Ala., Milton Lurie, Co. Engr., for calculating drainage areas and the structures necessary to serve them. Mr. Lurie says: "The time saved varies with the size and complexity of the area. One test case made in 1947 is typical. It took a party of four with a ½-ton pickup truck three days to plot a drainage area, while it was being plotted in the office from aerial photos, scale 4 ins. to the mile, in 20 minutes."

R. L. Williamson Co., Engr. of Gen-

eva Co., Ala., has used aerial photos for drainage areas and finds them cheaper and at least 20% faster. Sumter Co., Ala., Hadden B. Smith, Jr., Co. Engr., reports that "two of us did in an afternoon the work it would have taken a survey crew perhaps a week or ten days to do." R. M. Alexander, Jr., Co. Engr., Lamar Co., Ala., has found that by the use of aerial photos, the work can be done in ¾ the usual time. Pinal Co., Ariz., L. O. Fiscel, Co. Engr., makes preliminary surveys by aerial methods.

E. R. Hanna, Road Comr., San Benito Co., Calif., finds this method quicker and cheaper for reconnaissance study. Aerial surveys are quicker but not cheaper according to C. M. Gillis, Highway Administrative Asst., Riverside Co., Calif. San Joaquin Co., Calif., C. V. Jones, Deputy Road Comr., has found aerial surveys both quicker and cheaper; photos covering the whole county are available. T. W. Switzer, Co. Surv., Tulare Co., Calif., reports that this method is 50% to 90% quicker. A little cheaper and 25%



● **AIR-PHOTOS** are used for zoning purposes, drainage maps, road location, tax assessment mapping and many other jobs.

quicker. A little cheaper and 25% quicker is the report of J. W. Banister, Road Supt., Yuma Co., Colo.

Quicker and Cheaper

W. A. McMullen, Jr., Co., Engr., Pinellas Co., Fla., says aerial surveys are "cheaper and very much quicker." The same experience is reported by E. A. Anderson, Co. Engr. of Dade Co., Fla. Fenley Ryther, Co. Engr., Bibb Co., Ga., has aerial photos of the whole county and uses them for preliminary road location. Aerial survey methods are also used by W. P. Johnson, Co. Surv., Douglas Co., Ga.; and by H. A. Kluge, Supt. of Highways, Madison Co., Ill. Harry N. Smith, Supt. of Highways, Knox Co., Ill., reports it takes half as long for aerial photo zoning surveys, and it is cheaper. M. J. Benscoter, Co. Supt. of Highways, Morgan Co., Ill., also finds that aerial photos are quicker.

A savings of \$150 on a relocation survey was reported by Dallas Strubinger, Co. Engr., Pike Co., Ill. "Cheaper and quicker but no costs estimated" is the report of C. O. Brownlee, Co. Supt. of Highways, Shelby Co., Ill., while Lewis A. Lush, Co. Supt. of Sangamon Co. says "cheaper and 25% faster."

David H. Sharkey, Co. Supt. of Stark Co., uses aerial photos for plotting drainage areas; O. B. Dold, Co. Supt., Du Page Co., Ill., finds aerial survey methods cheaper and quicker. Homer Gardner, Hwy. Supt., Scott Co., Ind., finds aerial mapping cheaper and 10% faster, while L. E. Captain, Surveyor of Wells Co., Ind., reports them 60% faster. Thomas J. Courtney, Surveyor, Clay Co., does not find aerial surveys cheaper, but they are quicker; he saved two days on one job. Aerial surveys are both cheaper and quicker according to Walter R. Voght, Co. Engr., Blackford Co., Ind.

Iowa and Kansas

Of 40 Iowa counties reporting, 19 have used aerial surveys during 1949. Comments by County Engineers are as follows: L. W. Croft, Dallas, quicker and cheaper; Howard Porter, Jones, quicker and cheaper for figuring drainage areas for bridges and culverts; W. C. Stone, Audubon, quicker and cheaper, but no figures are available; R. J. Gibson, Taylor, the same; R. B. Thomas, Lucas, quicker and cheaper; Theodore Robison, Wayne, cheaper and "100 times quicker"; L. L. Lowry,

Howard, quicker and cheaper; Hugo Benefiel, Union, quicker and cheaper—"we borrowed the maps"; "quicker for preliminary locations only"—R. H. J. Martins, Scott; "quicker on drainage areas"—L. J. Schiltz, Dubuque; quicker and cheaper, Clair Davis, Mills; D. J. Lynam, Adair, the same; cheaper and 50% quicker, R. J. Wallace, Buchanan; 25% quicker, R. J. Justin, Johnson; quicker and cheaper, F. K. Brown, Decatur; cheaper and 10% quicker, T. E. Riley, Henry; "used for 2½ miles of road along with regular surveys," W. L. Anderson, O'Brien.

Of 41 Kansas counties reporting, 20 have used aerial surveys to a greater or less extent. Typical comments are: "We have the entire county on a scale of 8 ins. to the mile; the aerial maps supplement but do not replace regular surveys; they are used as a check."—Rufus Kirk, Co. Engr., Sedgewick Co. The following County Engr. report "quicker and cheaper"—C. H. Diefenbrock, Wabaunsee; Maloy Quinn, Clay; Donald Meath, Morris; Rex Lucas, Montgomery; C. T. Morbacher, Marshall; R. H. Eshoff, Meade; L. A. Tilton, Barber; M. M. Steele, Johnson; M. M. Mayse, Chautauqua; E. P. Knapp, Smith; F. D. Tyson, Rooks; and E. L. Walker, Pottawatomie. Estimates of time saved varied from none to 90%. G. D. Johnson, McPherson, found aerial surveys no quicker. J. I. Rice, Douglas, used surveys on old road location. Several reported "quicker but no cheaper." Emmon Robbins, Thomas, uses air photos on land surveys as a check on field work.

Uses by Other States

Aerial surveys have been used for road location and for planning dams in Gogebic Co., Mich. G. W. Koronski is Supt. and Engr., and he reports this method is quicker and cheaper. R. A. Trebilcock, City Engineer of Coldwater, Mich., says aerial surveys take about half the time of ground surveys. Aerial surveys are both quicker and cheaper according to Frank Evans, Engr.-Supt., Ingham Co. T. S. Dundon, Engr., Luce Co., thinks they are 75% faster. However, only 25% of the Michigan counties reporting say they have used aerial surveying for highway work.

Of 48 Minnesota counties reporting, only 12 have used aerial surveys. Typical comments are: Lloyd Nelson, Engr., Norman Co., "quicker for tentative locations"; G. E. Carlson, Engr., Mower Co., "for bridge

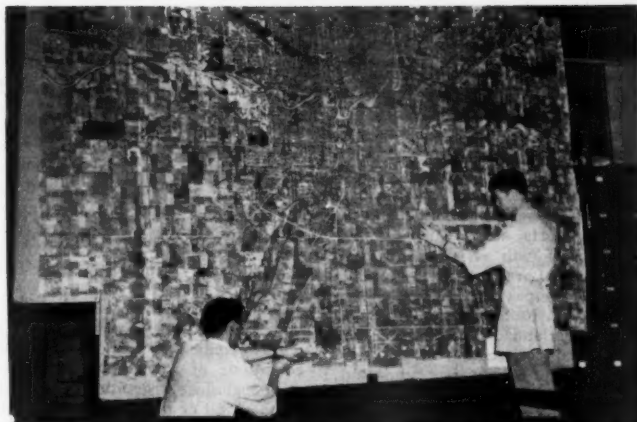
surveys and drainage; quicker and cheaper; entire county has been photographed"; E. S. Rankin, Hwy. Engr., Crow Wing Co., "quicker and cheaper"; C. W. Turnell, Hwy. Engr., Wright Co., and H. M. McLaird, Engr., Houston Co., the same; "We have used aerial surveys since 1939; direct savings are difficult to evaluate." L. B. Bjostad, Engr., Isanti Co.; Sibley Co., G. A. Anderson, Hwy. Engr., uses aerial surveys as an aid; H. E. Palmer, Hwy. Engr., Dakota Co., finds "50% or more saving" in time; Goodhue Co., E. M. Paulson, Engr., and Kandiyohi Co., E. S. Ward, Hwy. Engr., find aerial surveys cheaper and quicker.

In Mississippi, Daniel Kelly, Engr. of Leflore Co., finds this method of survey saves half on time. C. C. Redman, Jr., Engr. of Dunklin Co., Mo., uses aerial photos to help in surveying, and finds it speeds up the work. Pat Barnard, Engr., Saline Co., uses aerial surveys for tax assessment maps; Geo. Vossbrink, Hwy. Engr., Franklin Co., says aerial surveying speeds up the work 90%.

Carl Lemmer, Surveyor, Cascade Co., Mont., finds aerial surveys quicker. Wayne Linthacum, Surveyor, Big Horn Co., uses aerial surveys "as an aid." Ira C. Miller, Surveyor, Lincoln Co., uses them for "simple surveys." R. J. Hale, Engr., Missoula Co., finds aerial surveys cheaper and 50% faster. In Nebraska, L. R. Rudd, Engr., Hall Co., uses AAA photos for drainage maps, and finds this method 50% faster. B. F. Weidel, Chm. Rd. Commission, Thayer Co., also uses aerial maps for drainage work. Knox Co., John Forsyth, Chm. Bd. of Supvrs., also uses aerial maps. R. B. Cutter, Engr., Burt Co., Nebr., finds the work goes twice as fast using aerial maps.

Edward H. Maier, Engr., Cumberland Co., N. J., uses aerial surveys and finds the work is quicker and cheaper. Camden Co., S. H. Taylor, Engr., also uses them. Only one of 21 New York counties reports using aerial surveys, the one being Steuben, of which L. R. Bennet is Co. Supt. In North Dakota, Ward Co. is the only one of 12 reporting that uses aerial surveys. T. T. Loy, Sup. of Hwys. reports he finds them generally quicker and cheaper but has no comparable costs.

From Ohio, 24 counties reported: 10 use aerial surveys. Counties, county engineers and comments are: Athens, J. W. Dowler, cheaper and quicker for mapping. Williams, O. W. Eaton, cheaper and quicker.



● **COMPLETING** stapled mosaic of portion of county survey.



● **ENLARGEMENTS** make field data available in desk-top form.



● **TRANSFERRING** data from stereoscopic photos to tax maps.

These pictures courtesy Abrams

Lawrence, Ralph N. Hill, used for road location. Knox, $\frac{1}{2}$ cheaper and quicker. Tuscarawas, George Arnold, quicker and cheaper for tax maps. Ottawa, D. J. Nissen, fine for general use. Jefferson, Max Gorsuch, deputy, quicker. Champaign, N. H. Newton, cheaper and quicker, probably one-half. Greene, F. R. Lemcke, for drainage.

W. A. Blake, Engr., Garvin Co., Okla., reports aerial surveys cost about one-fourth as much. In Oregon, W. W. Larsen, Engr., Linn Co., reports "cheaper and quicker—about 50%". D. P. Raffensperger, Surveyor, Cumberland Co., Pa. says: "We used aerials for location on the Harrisburg Expressway for road and bridge location, and for the same purpose on the North Bridge at Harrisburg. It is hard to determine if it is cheaper but I am sure it is more convenient."

Neil Woodle, Hwy. Supt., Meade Co., S. D., has used aerial surveys but has made no cost comparison. C. C. Washington, Engr., Galveston Co., Texas, has used aerial photos. Hugo Price, Engr., Utah Co., Utah, finds aerial surveys "considerably" cheaper and quicker. E. Fred Lowe, Jr., Warwick Co., Va., Director of Public Works, has used aerial surveys for planning work. In Whatcom Co., Wash. R. T. Knutzen, Rd. Engr., has found aerial surveys cheaper and quicker for flood control planning. W. W. Athey, Road Engr., Adams Co., Wash., finds aerial surveying much cheaper and faster on drainage area work.

Three of 14 Wisconsin counties have used aerial surveys: Outagamie, F. M. Charlesworth, Engr.; Rusk, H. C. Iverson, Comr.; and Marinette, Fred Edwin, Hwy. Comr. From Wyoming, D. P. Miller, Surveyor, Sweetwater Co., reports he believes he

saves about 50% by using aerial survey methods.

Comment by the Editor

The foregoing data on the use of aerial surveys were reported to us by county engineers early in 1950. The information as given on the questionnaires was of special interest; not all of it could be presented here, but an attempt has been made to show the extent of use and the experiences with aerial surveying as reported by counties all over the nation.

Naturally the value of aerial surveys and the time they can save will depend very much on local conditions of topography and terrain, including vegetation; and also on the kind of surveying work that must be done. There is no question of the value of air surveys and every engineer ought to be familiar with what such surveys can do for him. It is the purpose of this article to show some of the ways in which aerial surveys have been used advantageously in county highway work. We thank our readers for contributing these worthwhile data.

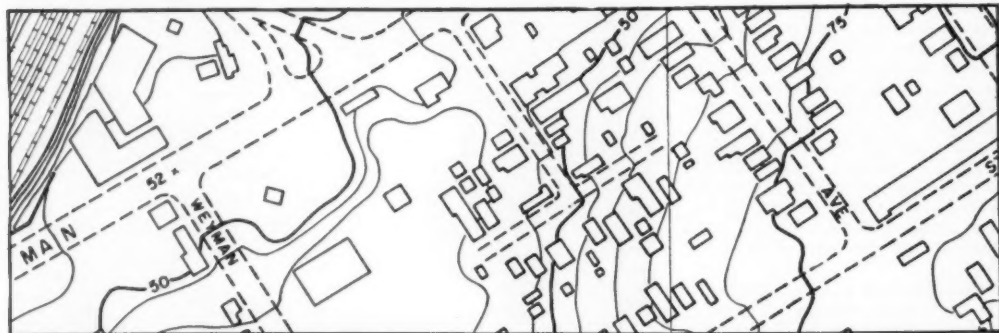
The Development of Sewerage in Los Angeles

The story of the development of sewerage service in Los Angeles, Calif., over the past 80 years is at once a capsule history of municipal problems in this field, and an indication of things yet to come. In Los Angeles, are illustrated nearly every problem of terrain, for in its 453-square mile area, elevations range from sea level to almost a mile.

Sewerage history in Los Angeles began in 1869 with the purchase of a few private drain lines. Four years later these were extended to the south and the sewage was used to

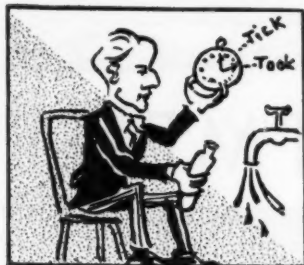
irrigate farms located in what is now the principal commercial area of the city. By 1887, there were 20 miles of sewers and a New York consultant was called in to plan a comprehensive sewerage system. Voters quickly approved funds for sewer extensions, but the planned outfall lines had to wait five years for approval and beginning of construction. These soon became inadequate and the sewage was again used for irrigation.

Shortly after 1900, a million-dollar bond issue was approved and the Central Outfall, a brick sewer still in use, was built. By 1920, the capacity of this line had been reached and in rainy weather the manholes overflowed. A couple of years later, two new outfalls were built and the Hyperion screening plant put into operation. Since then there has been a more orderly development of sewerage facilities to meet the needs of the city. Small sewer lines are almost always of vitrified clay; outfalls and interceptors are of reinforced concrete, sometimes with clay liners. The maximum distance of flow is 56 miles, requiring 18 hours. Many problems still remain, among them the 70,000 cesspools and septic tanks in outlying areas not reached by sewers; more extensions to care for the increasing population; and some new interceptors. Just now the most interesting project is the constructing of the huge new activated sludge treatment plant at Hyperion. This will treat a peak flow of 420 million gallons per day; it covers 76 acres and represents a \$41,000,000 project. Lloyd Aldrich is city engineer; Merrill Butler, deputy engineer; E. G. Studley, engineer of sewer design; and F. M. Darnell and G. A. Parkes, engineers of treatment plant design.



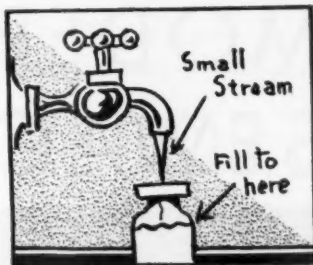
● MODERN methods of aerial surveying will produce quickly contour maps that are accurate

enough for all but the most exacting requirements. This article lists experiences of many engineers.



HOW TO

TAKE WATER SAMPLES



RECENT experiences in following up unsatisfactory water samples submitted to the Indiana State Board of Health Laboratories for bacteriological analysis, indicate that some of the intermittently contaminated samples are due to improper sampling techniques. It is surprising how often our engineers can go to the same spigot that produced a bad sample, or series of bad samples, and draw a portion which will be satisfactory.

One of the common replies to our inquiries concerning the probable cause for a bad sample is, "I dunno 'less I was a little careless collectin' it." It is one thing to know how and where to sample; it is another to use that knowledge.

Do not get the idea that the State Board of Health will ever accept poor sampling procedures as an excuse for a bad sample. We are inclined to agree with that philosophy which says: "Don't make excuses; make good." So it may be wise to review some of the fundamentals.

Procedure in Sampling

When choosing a sampling point on your distribution system, pick a spigot which receives reasonable protection, one that is not subject to fouling by splashing, by unusual handling, or by greasy rags. Although you might accidentally collect a good sample from a frost-proof yard hydrant or fire plug, the chances are against it. Water can flow both ways through the weephole.

Let the water run as rapidly as possible for several minutes by your watch. (Fig. 1) Don't rely too much on your judgment of time. Five minutes should be ample. Turn the valve down (Fig. 2) until only a small stream of water is running. Be careful that the stream does not splash back onto the spigot or that

previous splashings do not drop from the outside of the spigot into the sample bottle.

Some folks prefer to remove the protective paper which covers the stopper of each sterile sample bottle sent out from our Laboratories; others feel they have more protection by leaving it on the stopper. If you join the Board of Health in the latter school of thought, you will:

1. Grasp the sample bottle around the lower half to reduce the chance of finger contamination.
2. Carefully remove the rubber band from the neck of the bottle.
3. Move the stopper from side to side under the paper to be sure it is loose.
4. Crimp the paper around the mushroom top of the stopper so that it stands away from the sides of the bottle.
5. Remove the stopper and paper, holding the stopper in a vertical position so that the paper will protect it from falling dust particles or stray droplets.
6. Fill the bottle to within one inch of the neck of the bottle to form an air cushion large enough to keep the stopper from popping out when the water gets warm and expands.
7. Replace the stopper carefully and tightly, being sure that you have not touched it or the mouth of the bottle with your fingers or clothing. Drive it home with a sharp blow from the heel of your hand.
8. Smooth down the paper cover and replace rubber band.

9. Fill out the information blank completely. (Of course, we've got all that data in the office already, but we don't have an extra clerk to hunt it out of the files and post it on your sheet.)

This job of sterilizing taps with a flame before sampling is a misnomer, unless you use a blow torch and really pour on the heat. Using an alcohol flame will make you feel like a laboratory technician and may burn off a few bacteria or dust particles that are clinging to the surfaces, but matches and twisted paper torches serve a doubtful purpose unless your customers like smudged up spigots. There may be extreme cases where flaming is justified, but it should not be used routinely.

The Drinking Water Standards of the Indiana State Board of Health require that samples from disinfected water supplies be dechlorinated if they cannot be planted in lactose broth within 20 minutes after they are collected. For this reason the sample bottles sent out from our Laboratories contain sterilized sodium thiosulphate. It may appear as a white crystal or powder. At other times it looks like a small drop of water on the bottom of the bottle. *Don't try to rinse it out.* You will be almost sure to contaminate the bottle in process, if you do.

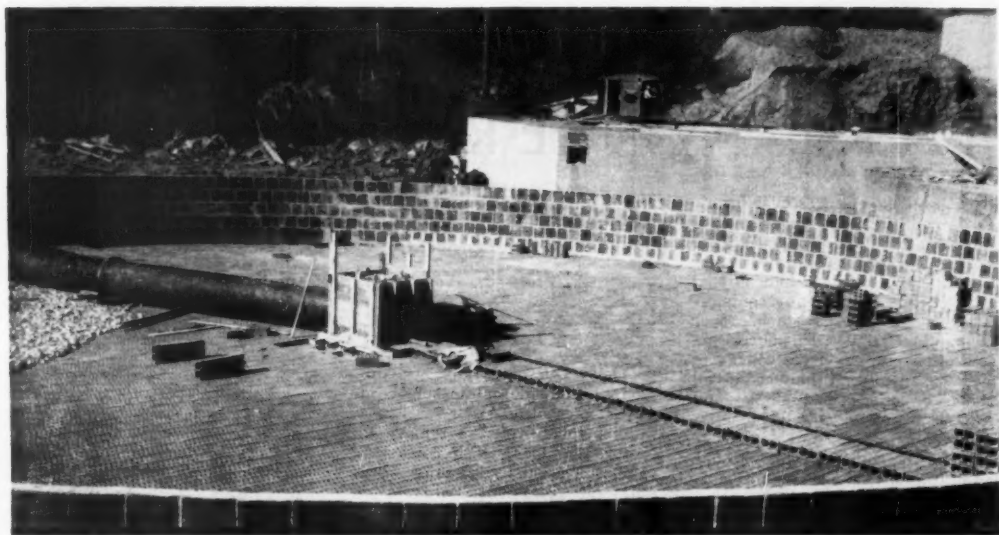
Choose your sampling points wisely. Stay away from new plumbing that has not been disinfected, if possible. Don't use a spigot that has a new washer or needs packing. Kitchen sinks and drinking fountains are poor sampling points. Be careful in your techniques. Then rely on the results you get back from the Laboratories and do something about it if they should be unsatisfactory.

Editor's Note: These data are from a publication of the Indiana State Board of Health.

George G. Fassnacht,

Chief, Water Supply Section,
Indiana State Board of Health

MODERN SEWAGE TREATMENT



A SEWAGE treatment plant for a summer resort where there is heavy storm water infiltration and a high degree of treatment is required is now being completed for the Village of Monticello, N. Y. The normal winter population of the Village is about 4,300; the summer population approaches 15,000, and it is expected that it may reach 22,500 within the next ten or fifteen years. During storm periods, the flow of sewage reaches a peak of 6 mgd; present winter flow is 0.6 mgd; and the probable future maximum summer dry weather flow is expected to be 2 mgd. The problem was to design a plant that would (1) give the high degree of treatment necessary to prevent stream pollution and nuisance during the summer months; (2) handle storm flows automatically without interruption to plant operation, providing some treatment for them; and (3) treat the small winter flows adequately and economically.

Plant units consist of a Parshall flume; a combined mechanically cleaned screen and grit chamber; primary settling tanks; two stage high rate filters of the biofilter type; a secondary settling tank; chlorina-

● **FILTER walls are of vitrified clay blocks, reinforced. Under-drain system, center channel covers and feed pipe are in place.**

tion; separate sludge digestion; and vacuum filtration of the sludge. The plant is located on the site of a plant built in 1907, and adjoins the Village limits. There was no other available and suitable plant site, though all possible locations for a distance of about three miles were investigated.

There are no significant contributions of industrial wastes, the sewage being almost wholly domestic in character. Past water usage indicated a sewage flow of about 85 gpcd for dry weather summer peak population periods. Therefore, the plant was designed for a flow of 2 mgd and an organic loading of 3,750 pounds of BOD; it was also designed to handle through the settling tanks and the filters the entire storm flow, none being bypassed.

Primary Settling Tanks

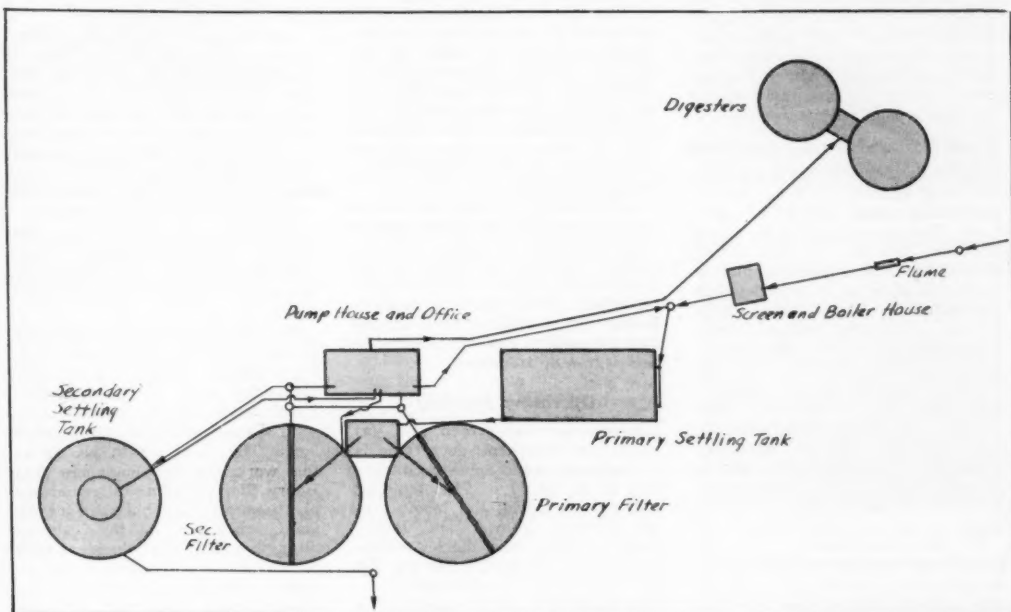
Since the old plant had to continue to function during the time required to construct the new one, and since ground space was limited, plant layout was subject to some restrictions. Two rectangular pri-

mary settling tanks, each 20 ft. wide, 95 ft. long and 8.8 ft. average depth provide 2 hours detention for the design flow of 2 mgd plus 1 mgd recirculated from the primary filter. They also provide 1 hour detention for the anticipated 6 mgd storm flow. These tanks are equipped with Link Belt sludge collecting mechanism. The raw sewage enters through four 24-in. inlets about 4 ft. below the surface of the sewage in the tank. This variation from rather standard design was necessary because the incoming sewer had to pass under the only available access road to the plant.

Multiple weirs are provided at the outlet end of the tank, so that the overflow rate is about 15,000 gallons per ft. length of weir per day at the design flow rate plus recirculation. Sludge is removed from the hoppers by either hydrostatic pressure or by pumping, and passes directly to the sludge pumps, which are provided with sampling devices. Sludge is not exposed to view until it enters the sludge filter for final dewatering.



FOR A SUMMER RESORT



● LAYOUT of plant, showing a few of the pipe lines installed.

From the primary tanks, the sewage flows to a two-compartment dosing tank. During normal biofilter operation, only the dosing tank serving the primary filter will operate. During flood periods, the recirculating pumps cut off automatically and both dosing tanks go into operation. In the winter, when the filters are operated as low rate filters, without recirculation, both dosing tanks are in use.

There are two filters, each 85 ft. in diameter and 4½ ft. deep. Underdrains are Bosco; distributors are American Well Works 3-arm; a part of the filter media was taken from the old contact beds, and the remainder was new stone. Media size is 2½ to 4-in. The walls of the filters are of Natco vitrified clay blocks, reinforced with circumferential rods. Since the filters are wholly above ground, the use of the vitrified blocks adds to the appearance. No provision is made for flooding the filters, and none for ventilation except the use of adequate underdrains and channels.

When operating as biofilters, the

raw sewage flow plus 1 mgd of recirculated primary filter effluent (which has been returned to the primary settling tanks) is applied to the primary filter. At the design flow of 2 mgd, the volume of recirculation is one-half of the raw sewage flow—more at lesser flows. Therefore, 3 mgd is applied to the primary filter at design flows—less at lower flows. Application at the rate of 3 mgd to the secondary filter is by a pump, and this does not vary. Effluent from the primary filter flows to a sump from which 1 mgd is returned to the primary settling tanks; the remainder overflows to the secondary pump sump and, with a contribution from the secondary settling tank sufficient to bring the total to 3 mgd, is applied to the secondary filter. When the raw sewage flow is less than 2 mgd, a greater amount is withdrawn from the secondary settling tank, resulting in a higher recirculation ratio.

The final settling tank is circular, and is equipped with a Link Belt

Circuline sludge collecting mechanism. The tank is 70 ft. in diameter and 7 ft. sidewater depth, providing in excess of 2 hours detention for the design flow. A central launder collects the flow to be returned to the secondary pump sump for application to the secondary filter.

The secondary tank discharges to the existing outfall line serving the old plant. This permits use of the existing extensive sand beds for polishing the effluent if this should prove desirable in the future. However, it is believed that under the loadings expected for some years to come, the quality of the effluent will be such as not to require additional treatment.

Digesters and Gas Utilization

Two digesters are provided, each 50 ft. in diameter, utilizing the Dorr multigestion system. The primary tank is heated while the secondary tank is of the gasholder type, but piping is so arranged that either

tank can be used for either primary or secondary digestion. Tanks are of the prestressed type. Vertical removable pipe heat exchangers are used.

The digesters provide approximately $3\frac{1}{2}$ cu. ft. per capita of heated volume, based on the maximum load. It has been found desirable to base digester design in this climate on the maximum load that persists for more than three or four weeks. Therefore, design for a summer resort having a ten or twelve-week season must be based on the maximum population served.

Flood Flow and Winter Operation

When the flow of sewage reaching the plant exceeds 3.5 mgd, the recirculating pumps cut off automatically. The primary dosing tank then overflows into the secondary dosing tank and both dosing siphons go into operation. A weir is provided between the two dosing tanks which permits overflows, without overtopping the tanks, when flows occur which are in excess of the capacity of the primary distributor, which is 3,150 gpm. When the secondary dosing tank operates, a check valve prevents backflow to the secondary pump sump; and when the pump is in operation, another check prevents backflow to the secondary dosing tank.

By this arrangement, it is expected that sufficient treatment will be given to storm flows to prevent any nuisance downstream from the plant. Storm flows may persist for two or three days after a rain, and

untreated sewage and storm water could cause nuisance in the small stream into which the effluent is discharged.

All of these changes in operation are designed to take place automatically, permitting operating attendance for only 8 hours a day. If a storm occurs at night, recirculation is cut off and the two dosing tanks go into operation. However, biofilter operation is not restored automatically, but must be done by the operator. It is not believed that the changeover will have any effect on the quality of the effluent, as several days of operation as a low rate filter does not impair the ability of a high rate filter to operate immediately as a high rate filter.

In the winter recirculation will be discontinued and the filters will be used as straight trickling filters in parallel. The organic loading on this basis will be high. If the effluent is unsuitable, either primary recirculation or secondary recirculation may be used, as desired, to increase the degree of treatment.

Operating Building

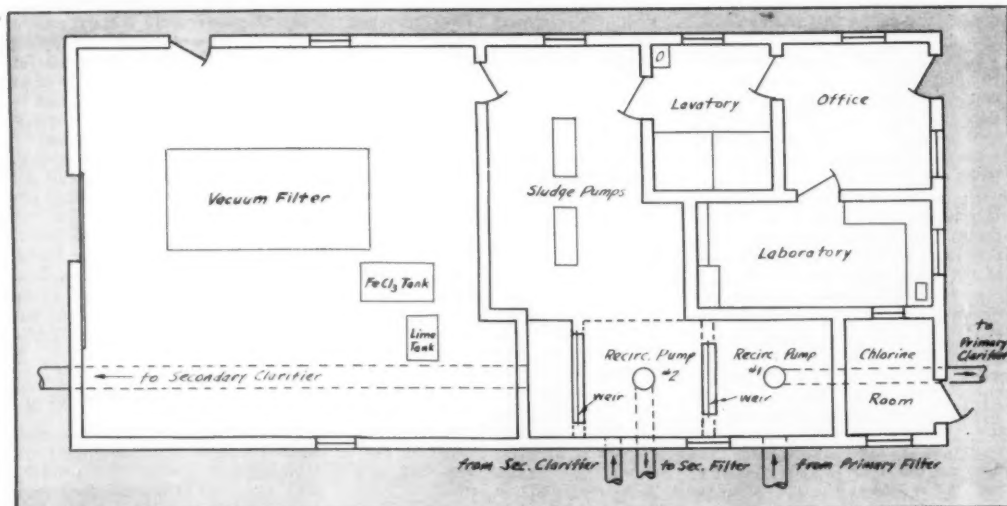
Except for the screen and gas utilization equipment, everything is housed in a single operating building, 29 ft. by 60 ft. This building contains the office; the laboratory; the lavatory, shower and locker room; a heating unit; the recirculating pumps; the sludge pumps; the chlorinator; and the vacuum filter. The building is brick veneer. The laboratory, office and lavatory have tiled walls. The remainder of the

building interior is of cinder blocks.

No sludge beds are provided as it is intended to dewater all sludge by vacuum filtration. However, an existing sludge lagoon is available, and some of the extensive old sand beds could be used for sludge disposal. Sludge from the vacuum filter will be handled by a belt conveyor into a truck for disposal, eliminating all manual handling.

On the basis of present summer loads—a flow of 1.4 mgd and a population of 15,000—it is expected that the effluent BOD will be not more than 20 ppm and may be less. At full loading—a flow of 2 mgd and a population of 22,500—the expected BOD range will be 25 to 27 ppm. The winter load is light—about 4,300 population and 0.6 mgd. Without recirculation and in cold weather, the effluent BOD will probably range from 45 to 55 ppm. No estimate has been made of the results with storm flows.

The plant was designed by Olney Borden of Liberty, N. Y., and W. A. Hardenbergh of New York. The contractor was McElwee-Courbis Construction Co. of Erlton, N. J., with Walter Wilson as construction sup't. The inspector in charge of the work for the engineers was Henry Rieping, who will remain as plant operator. The bid price for the plant, exclusive of the vacuum filter, was \$247,757. Coincident with plant construction, sewers were extended to serve all homes within the Village limits. This work, and the design of three pumping stations, was handled by Mr. Borden.



● OPERATING building houses office, laboratory, pump facilities and sludge dewatering equipment.

Controlling Filter Flies



Arnold M. Livingston
Chemical Insecticide Corporation

BASED on experiments conducted during the summer of 1950 at two different sewage treatment plants, a new method of psychoda fly control has been developed, using Chem-Larv which has the advantage of dissolving readily in the sewage and forming a true solution. This solution is readily absorbed into the zoogelial film covering the stone particles in trickling filters. Tests have been made on both low-rate and high-rate filters and this article will give information on the computation of dosage and methods of application.

The series of compounds called Chem-Larv can be used for the control of trickling filter flies, both *psychoda alternata* and *albipunctatus*. Different toxicants may be prepared on this same base, and it is recommended that control begin with Chem-Larv 1. Control for periods up to one month after application have been obtained; the chemical does not affect the functioning of the filter nor cause it to unload; it does not create odor or other objectionable conditions in the effluent stream. Two or three days are required after application before the full effect of treatment is apparent.

Control Methods

The insecticide should be added to the liquid influent at the dosing tanks prior to application to the filters. This produces a more thorough dispersion of the toxicant over and through the bed. Addition is gradual, over a period of several hours, with the result that a longer contact period of the insecticide elements with the film on the filter particles is obtained. This results in more complete destruction of the larvae in the film covering the stone. It is believed that some other com-

monly used insecticides have resulted in a change of life habit by the larvae. In order to survive, these have changed from surface feeders on the zoogelial film to inner-film and under-film feeders. Consequently, it is necessary to use a material and employ a method of application which will insure a complete penetration of the film with the toxicant material.

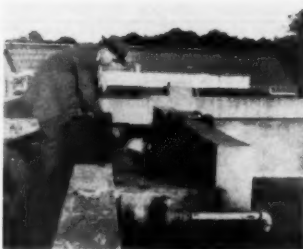
In addition to the use of an admixture with the sewage, it may be desirable to use a mechanical applicator, as a fog machine or a mist blower, to augment the control procedure, particularly where a considerable adult fly population already exists. Mechanical application of this type can leave residual deposits on walls and buildings which will help in quickly reducing the population and will tend to prevent or reduce the rate of growth of a future adult population.

Computing the Dosage

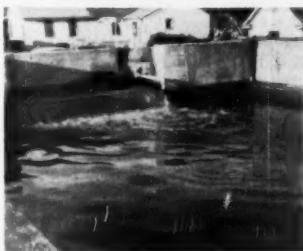
In the tests carried on in 1950, various dosages were used. Good results were obtained with applications of 1.67 gals. per acre foot, or 16.7 pounds, since Chem-Larv weighs 10 pounds per gallon. This was based on an average flow of 1.5 million gallons of sewage in 24 hours, and applies primarily to low rate filters. In Ridgewood, N. J., John Hood used 16.7 gals. per acre-foot and obtained control for periods of 3 weeks or more. The Ridgewood plant is a low-rate filter, 6 ft. deep, with a volume of 3 acre-feet. On June 29, 5 gallons were applied to the filters, using 10 dosages of 0.5 gal. each per 10,000 gallons of sewage; five dosages were applied to each of the two dosing tanks. First reappearance of the flies was noted on July 16, but retreatment was not needed until July 24. On that date, half of the previous dosage was applied, but this appeared to be too small to produce favorable results; and other applications were made on Aug. 15 (same application as on July 24) and on Aug. 26, when good results were obtained. Another application was made on Oct. 3.

An acre-foot of stone is, of course, the area of the filter in feet times its depth in feet, divided by 43,560, which is the number of square feet in an acre.

(Continued on page 70)



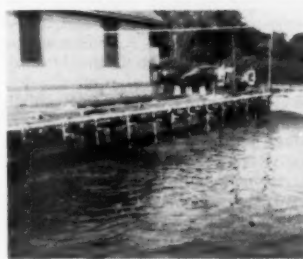
● **GETTING ready to begin.**



● **RIDGEWOOD'S dosing tank.**



● **THE Ridgewood filter beds.**



● **PRIMARY settling tank.**

This is the fourth of a series of articles on small water plant design and construction. This one considers filtration. Previous articles have discussed quantity of water, sources of supply, and flocculation and sedimentation.

ONLY a few states have prepared detailed requirements for small water treatment plant design, preferring to consider each job in the light of local conditions. Consequently, the data herein are based on recognized standard design procedures with supplementary information through personal letters from a number of State Sanitary Engineers. It seems unfortunate that it has appeared impractical to establish and publish at least basic information on design for this kind of work.

For public water supplies, the gravity type of rapid sand filter is used almost universally and is preferred and generally required by all states for the treatment of surface waters. Numerous variations in design and construction are found in small plants. Both conventional rectangular and tub filters are used, and both types appear to give full satisfaction. Even in small plants, two filter units should generally be provided. These should be of such capacity that one-shift operation can provide the quantity of water necessary to meet peak demands for some time in the future. The cost of extra filter capacity is small compared to the continuing costs of labor for 2-shift or 3-shift operation. Moreover, intermittent operation provides a long period of sedimentation for at least a portion of the water going onto the filters, resulting in better than usual clarification.

State Sanitary Engineers agree in requiring that filters be designed for a rate of 2 gals. per sq. ft. per minute. It is universally felt, despite the recent considerable discussion regarding higher filter operating rates, that the small plant should be designed on conservative and well-established criteria. A reason commonly given for this is the lack of operating skill and of pretreatment facilities found at so many small plants. On this basis, the area of filters required in square feet for one-shift (8-hour) operation is given by dividing the gallons per day to be delivered by $2 \times 8 \times 60$, and making allowance for withdrawals of the units from service for washing and the time required for starting and stopping in the morning and at night.

SMALL WATER



● FILTER plant, 100 gpm capacity, Palmetto, Ga., showing settling basin and mechanical mixing basin at the left.

The coarser the filter medium, the longer the filter runs will be between washings, but the bacterial quality of the water may not be as good as when a finer sand is used. The final decision will be influenced by the reliance for bacterial removal that is placed on chlorination. However, standard practice should be followed. Texas requires "an effective size between 0.35 mm and 0.45 mm, and a uniformity coefficient between 1.4 and 1.8." Requirements depend somewhat on location and water characteristics. They should usually specify size limits between 0.35 mm and 0.55 mm, with a uniformity coefficient of 1.5 to 2.0. In case of doubt, advice should be sought from the state sanitary engineer. Either anthracite or sand may be used. The former is well adapted to use by small plants (see PUBLIC WORKS for May, 1950) but most

small plants have, in the past, used sand. Information on anthracite can be obtained from Palmer Filter Equipment Co., and on sand from Wedron Silica Co., Northern Gravel Co., Ottawa Silica Co. and Hungerford & Terry. It is usually far better to purchase the small amount of

sand required for a small installation from dealers who specialize in it than to attempt to utilize local sources. The same applies to gravel, if used for supporting the sand bed. About 24 ins. depth of sand is used. This is supported on about 18 ins. of graded gravel, under which is a drainage system; or porous slabs of various designs may be used in place of the gravel bed, usually with some simplification of design.

The depth of the filter box is that of the filter bottom (including gravel, if used), plus the depth of the sand, plus an allowance of 5 to 8 or 9 feet (depending on the head at which it is desired to operate the filter), plus a freeboard of 12 to 24 ins. The filter should never be operated under negative head; therefore, the loss of head at which it is planned to operate the filter must be provided over the sand.

Wash water rates recommended by state sanitary engineers vary somewhat but not more than would be expected from conditions existing in the various parts of the country. Texas requires "not less than 20 ins. vertical rise per minute and not more than 30 ins., which should expand the sand bed 30%

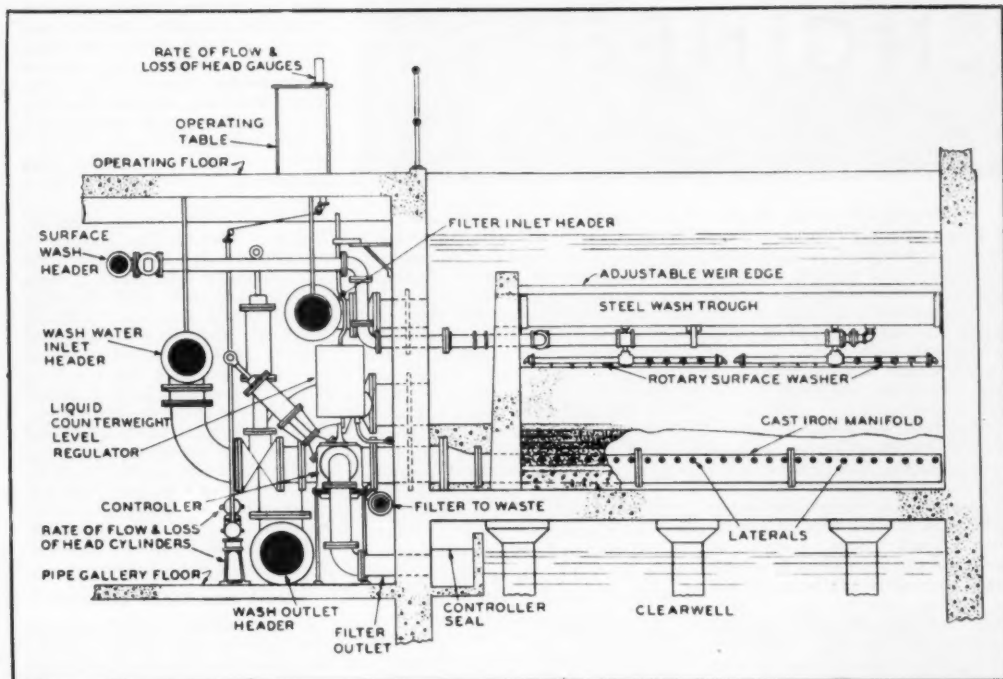
to 50%." In South Dakota, the minimum preferred rise is 24 ins. Georgia recommends "the conventional 24-inch to 30-inch rise." Tennessee recommends a rise of 30 ins. Temperature of water and size of sand grains are factors that influence the rise.

A rise of 30 ins. of wash water

small plant designer should be generous with equipment which will facilitate and simplify operation.

In plants with the conventional collection and wash water distribution systems, employing pipes and underdrains under a gravel layer supporting the filtering medium, a pressure of about 15 pounds should

FILTRATION PLANTS



Courtesy Permutit

- **SECTION through a typical gravity filter, showing usual piping arrangements, surface wash and underdrain facilities.**



Courtesy Stanley Engr. Co.

- **FILTER plant recently completed at Clear Lake, Iowa.**

per minute requires 18½ gallons per sq. ft. per minute. If the filter area is 50 sq. ft., about 940 gpm. of wash water must be provided, either by an elevated tank, by pumps, or by withdrawal from the mains.

At least one state, Georgia, recommends the use of mechanical agitators for keeping the filter bed free from incrustations, mud balls and slime growths. In the small plant, such equipment should be of special usefulness in reducing operating difficulties due to inadequately conditioned water. In general, the

be available at the strainers during washing. Laterals should be spaced 6 to 12 ins. on centers and velocity in them should not exceed 8 ft. per second. The total area of the orifices for distributing wash water will generally be 0.2% to 0.3% of the area of the filter. The header supplying the laterals should be large enough to deliver the required wash water with a velocity not greater than 6 ft. per second. The use of porous diffuser plates or of perforated vitrified clay blocks in
(Continued on page 54)

EQUIPMENT USED BY COUNTY ENGINEERS

IN Alameda Co., Calif., Wallace Boggs, County Surveyor and Road Commissioner, completed realignment of 0.3 mile of mountain road to eliminate dangerous curves. This necessitated heavy cuts and fills, which were made with a roofer, a bulldozer, tractors, carryalls and a motor grader. San Diego Co., J. H. Mack, Surveyor and Road Com'r., used a grid roller for reducing old oiled surfaces for remixing, and reports a definite reduction in cost. Santa Cruz Co., F. R. Pracht, Road Com'r., utilized a central asphalt mixing plant and hauled the mixed material to various jobs in trucks. Chas. Vogel, Road Com'r. of Tuolumne Co., reports using a front end loader with a 1½-yd. bucket for loading material out of mine dumps and slate pits, and for cleaning slides and removing snow from roads. Carl F. Lind, Co. Engineer, Sutter Co., used a "Preparer" for pulverizing an old bituminous oil-mix road for reoiling.

Farm-to-Market Roads

Using a ½-yd. shovel, 7 crawler tractors and 10 motor patrols, Shelby Co., Ala., R. K. Parks, Co. Engineer, has been topping, grading and draining farm to market roads. H. L. Carter, Jackson County Engineer, Ala., used motor patrols, a bulldozer, and tractors and pans on grading, and draining farm to market roads. Jefferson County, C. J. Rogers, Engineer, paved 60 miles of DSBT, using regular county equipment.

In Seminole Co., Fla., H. B. Gray,

Road and Bridge Supervisor, has used a front end loader mounted on a wheel tractor for loading material taken by motor graders from the high shoulders of paved roads. E. W. Carroll, Hillsborough Co. Engineer, in building mixed-in-place sand-bituminous roads used 2 motor patrols, 2 pulverizers, 2 tandem rollers, 2 3-wheel rollers, 2 bituminous distributors, 1 tank car heater, trucks and, in bridge and sewer construction, a well-point system. About 25 miles of mixed-in-place roads are built each year, as well as resurfacing of about 70 miles.

Cleaning Roadside Ditches

E. C. Van Sickle, Fulton Co., Ill., Superintendent of Highways, used an elevating grader to clean road ditches. W. M. Phillips, Jefferson Co., Superintendent of Highways, found that a force feed loader, with trucks hauling away the surplus dirt, was the most efficient equipment used last year. The work included both cleaning of old ditches and constructing new ones. Moultrie Co., George Dedman, Sup't. of Highways, used a small crawler crane for excavation and pile driving. C. V. Dawson, Cass Co. Sup't. of Highways, used a bantam truck crane for cleaning ditches and constructing bridges and culverts.

O. K. Frink, Polk Co. Engineer, Iowa, used a force feed loader for salvaging and loading old surfacing materials before grading operations. J. R. Streeter, Engineer of Neosho Co., Kansas, says: "We have

been removing osage orange hedges that have grown into trees and overgrown our roads. For this work, we used a heavy tractor. Until this year, we had nothing that would handle this work without wasting a lot of time. Roads that are shaded by these hedges are slow to dry out after a rain and the snow does not melt on them, so that they remain frozen longer and are hard to maintain. We are trying to remove these hedges where the farmers will permit on the south and east sides of roads, and on both sides, if possible."

Ditching and Bank Sloping

Bracken Co., Ky., Clyde Parker, Road Supervisor, reports that the main work during the past year was ditching of roads that had not been ditched for several years, using a motor grader, a loader and trucks. V. E. Crabtree, Koochiching Co. Engineer, Minn., used effectively for bridge building a ¾-yd. dragline-crane and a 12-inch electric saw powered by a small motor driven generator.

J. H. Dupont, County Highway Engineer, Stevens Co., Minn., reports backsloping 35 miles of road ditch banks in 1949. Motor graders were used for this work. The sections improved were spots that had previously been snow traps and were on roads that are not scheduled for reggrading within 5 years. Most of the sections were 30 ft. from the centerline, and the sloping cut extended 5 ft. to 10 ft. The material removed was spread uniformly in adjacent fields to a width of 50 ft. from the centerline. This was not objectionable to the farmers since most of the material was topsoil. This work has been very effective in eliminating snow drifting.

Brush and Weed Control

A front-end force feed loader has been used by Oswego Co., N. Y., W. H. Hackett, Co. Engineer. This machine has been very effective on a large-scale maintenance program, and was also used in cutting and cleaning ditches, grubbing brush, and cutting back banks to eliminate snow hazards. Also, many new drainage structures were installed. A 78-ft. clear span bridge, on a 60° skew, was built by Oneida Co., N. Y., W. J. O'Brien, Engineer, at Westmoreland. This bridge had a 20-ft. roadway and two 4-ft. side-walks. Cost was \$39,596.

Guy Elbin, Engineer of Franklin Co., Ohio, reports that weed control has been a good paying investment, reducing mowing costs, plus giving an intangible return in better roadside appearance. Three Myers

sprayers were used, and one held in reserve; 2,4-D was the agent used. For the coming year, 8 more sprayers will be available—one for each of the patrol districts.

LeFlore Co., Okla., Leo Best, Engineer, regraded and placed gravel surfacing on 85 miles of roads, using trucks and front end loaders following motor patrols. Native pit gravel, $\frac{3}{4}$ -inch and down, and burnt mine shale were used. Tulsa Co., F. E. Hathaway, Engineer, constructs mainly bituminous soil stabilized roads, with single bituminous surface. In the past three years, through the use of better equipment the method of construction has been improved, cost reduced, and better roads have resulted.

Brown Co., Wisc., E. Francis Brunette, Commissioner, built a hand pile driver in the county shop and uses this to drive treated tim-

ber piles for bridge abutments. With this driver, it is easier to drive on a batter than it is with a crane, and work with it has been very successful. Sheboygan Co., Wisc., Fred C. Lau, Superintendent, uses a bituminous mixer, and runs gravel directly from the crusher to the mixer, using a 21-yd. bin for an equalizer.

Thane H. Baldwin, Jr., Engineer of Big Horn Co., Wyo., reports building 4.6 miles of new county road, 0.75 mile of which was very heavy grade on steep side hill and in hard shale. Tractors were used with bulldozers and scrapers to make the cuts and fills. Some ripping had to be done in the shale to make the scrapers effective. The maximum cut was 38 ft. and the maximum fill 70 ft. After the roadbed was shaped and compacted, it was covered with 4 ins. of pit run gravel,

which was handled from the pits into trucks by a half-yard dragline. The whole project was completed in 60 days at a cost of \$21,000.



Courtesy Barber-Greene

● **COUNTY asphalt plant, permanently set up, loads mix directly into trucks on ramp.**



Courtesy Caterpillar

● **MOTOR graders, part of a fleet owned by Bayfield Co., Wisc., above, are mixing black top**



pavement. At right, a team composed of breaker and loader improve Calif. county road.



Courtesy Osgood

● **POWER shovel, owned by Summit Co., O., at work on county road improvement program.**



Courtesy Huber

● **MANY county engineers rate the motor grader their most useful piece of equipment.**

NEW EQUIPMENT

R. F. MOTT

City Manager, Galena, Ill.

After a slow decline in population during the difficult 1930's Galena, Ill., began to grow again. Early in 1940, the population count totaled 4200. Today, the population is estimated at 5000 and is steadily increasing. Accordingly, a complete rejuvenation, maintenance and new development program has been inaugurated. Outstanding among the multitude of projects under way by the Department of Streets and Improvements, are the extensive maintenance, repair, and building of more than 40 miles of paved and unpaved roads; new culverts and drainage systems to control the heavy run-off from the steep inclines; an extensive levee and flood control project; and the grading and finishing of new industrial sites.

The largest part of all city revenue is spent by the Department of Streets and Improvements. Beginning with the new fiscal year on May 1st, 1950, the city's street crew carried out a program of grading, ditching, and graveling of unpaved streets; patching and repaving of paved streets; snow removal and street cleaning; sewer repairs and cleaning. At the beginning of the year 1949, the Department functioned on practically man-power alone, but in the fall, the citizens voted 3 to 1 to issue \$20,000 of bonds to purchase street equipment. The results afforded by the action have been rewarding to the tax payers.

Although the revenue for the fiscal year 1949-1950 was \$6,982.18 less than the previous year and the administrative cost was up an estimated \$5,439.98 over the past fiscal year, due to the hiring of a city manager, we reduced the deficit in the general fund by \$1,654.35 by May 1, 1950.

This saving to the city was achieved through an overhaul of city practices and procedures. New ideas included purchasing the most efficient equipment and a more economical and effective use of man power. Expenditures were budgeted



● **MOTOR** grader with end loader, scarifier and plow cuts street department labor requirements by 40%.



● **SOME** streets have grades of 22%. Lots of power is needed for summer maintenance and winter snow removal.

and an accounting system and pre-audit of expenditures were introduced.

The major equipment purchase was an Allis-Chalmers Model D motor grader with a Tractomotive end loader, scarifier and snowplow attachments. This versatile machine was so effective that it was possible to reduce the man power of the street department by more than 40%.

The savings in wages alone were substantial. With this motor grader it was possible to do more grading in one day than could formerly be done by the old tractor and towed grader with two men in one week. It has dug ditches in 4 minutes that formerly took one man with pick and shovel four days. And the ability of the end loader attachment to reduce costs has been proved con-

IMPROVES ECONOMIC STATUS



clusively, as it now takes the Model D motor grader four minutes with two men (operator and truck driver) to load a truck with material where formerly it took four men twenty-five minutes.

Streets are a Challenge

Galena's roads are not ordinary right-of-ways. They present a great challenge. Many of our main travel routes have grades that are steeper than 22%; in short, they are unbelievably steep. In spite of this, last winter's snow removal program was carried out with satisfying results, although not the ultimate in effectiveness. Snow in the business district was removed at a rate of about 150 yards per hour by our motor grader. This, of course, followed the procedure of windrowing, picking up and dumping into trucks. Trucks were our problem. Some of the merchants donated trucks and drivers for carrying away the snow but the lack of an adequate number of trucks was apparent since the grader could have loaded more trucks than were available.

Through the spring and summer, our grader has been working at grading, bank cutting, sloping, and ditching, spreading gravel and placing an asphalt binder on as many unpaved streets as possible. The steepness of many residential right-of-ways demands adequate and precise ditching for the control of high-velocity run-off. Now, most of our unpaved roads are worked to the point where they will be easily passable, even in bad weather.

Saving Through Planning

Further savings to Galena are accomplished by prior planning and scheduling of work in the street building and maintenance program. Although attention is given to emergency complaints, sectionalized working on city streets is the usual thing. We repair roads, remove snow and clean streets in an orderly man-

ner rather than wasting time and equipment by running helter skelter throughout the city taking care of individual complaints. While all of the complaints are taken care of, they are fitted into the overall program on the basis of urgency rather than political or other considerations.

Another saving of city personnel was accomplished when Galena disposed of the city scales. The scales were being used by a few individuals only, since most persons who do much weighing own their own scales. This state-owned item was being manned by city personnel at city expense.

Flood Control

Throughout the past year action has been taken to reduce the flood damage to the city from the Galena River. The levee building program at Galena is basically a federal program under the United States Corps of Engineers.

Galena contributed \$118,000 to the flood control project, of which about half came from the state of Illinois. About \$600,000 including the local contribution has been spent to date. Another \$292,000 in federal funds was approved last May by the Federal Government for the Galena River project. Also, the Illinois Central Railroad has spent large sums to keep pace with the flood control program.

Building of levees at the river is now about half complete. The west levee will ultimately reach a height of 11 feet above the 1937 flood (gauge level of more than 27 feet). It now stands 18 inches above that level. The east levee will eventually be as high as the west levee now is.

The flood control project is also accomplishing another purpose in steep hilly Galena. The dirt being used for the levees is being taken from a large area near the utilities company plant at the southern edge of the city. This will leave a large

level area for industrial location. We have been contacted by several industrial concerns as to the possibility of moving here.

Other work in this department, underway or just finished, includes construction of off-street parking by leveling and surfacing vacant property in the business district; new industrial sites to accommodate the interest being shown in this community by manufacturers; and the constant development of right-of-way to meet the rate of expansion. Our new modern equipment has made this possible. The citizens of Galena can look forward to decent, pleasurable, and efficient driving on most of Galena's streets throughout the coming year.

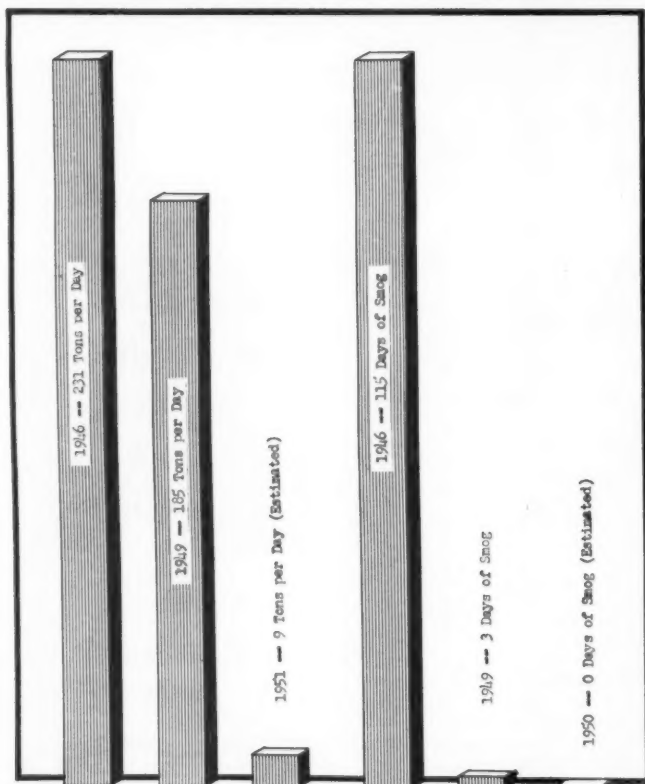
OVER-ALL
PLANNING
SAVES
TIME
AND

Community
Funds





● **HOW Kingsport looked before the air pollution control program was started. See chart below for improvement data.**



● **ESTIMATED tons of dust emitted by two major plants contributing to air pollution, as estimated by Director J. M. Kimbrough of the Air Pollution Control Department.**

● **NUMBER of smog days reported in Kingsport in 1946 (before passage of ordinance), in 1949 (before control was completed) and number expected in 1950.**

AIR

NEIL L. CUNNINGHAM

Managing Editor, Kingsport News

ONCE a man and his wife were traveling through East Tennessee on a train. The man turned to his wife and said, "Wonder where we are, dear?"

His wife suggested he stick his head out of the window and see if he could spot a sign. The husband complied, and when he pulled his head back inside the window, it was black with smoke and soot.

His wife took one glance and said, "I don't need a sign to know where we are. It's Kingsport, Tennessee."

That was the Kingsport of 1946; but not the Kingsport of 1950. Today, Kingsport has eliminated most of the smoke and pollution that once hung over the city.

Kingsport is a model industrial city. Its planners utilized its land and natural resources well. Industries sprang up. Smokestacks meant payrolls—but they also meant air pollution. Clouds of smoke from soft coal billowed from residential chimneys to aggravate the problem.

In October, 1946, the city's board of mayor and aldermen, by unanimous decision, voted to employ the services of a man largely responsible for ridding St. Louis of its notorious smog. Professor Raymond R. Tucker was hired to examine the air pollution situation in Kingsport. He arrived shortly after Christmas, in time to see the heavy winter atmosphere clouded with dense smoke and soot.

The professor stayed little more than a week. While here he made surveys and met with city industrialists.

On January 4, he told a joint meeting of the mayor and aldermen and a special five-man smoke-abatement committee that the problem in Kingsport could be remedied.

A Report on Smoke Control

Prof. Tucker issued a 51-page report outlining a plan of action. The report called for two new ordinances, a special department with officers to carry out the anti-air pollution program, a board of appeal from decisions made by anti-air pol-

POLLUTION CONTROL for a CITY

lution officials, and impartial enforcement of the ordinances.

He also recommended a program calling for the use of mechanical fuel-burning equipment to burn coal then being used. For hand-fired furnaces, he recommended fuel with less than 25% volatile matter on a moisture and ash free basis.

An analysis of fuel used by industrial, commercial and domestic users in Kingsport at that time showed 36 to 38% volatile matter in the fuel.

Heating value of this fuel was approximately 14,300 btu per pound.

Mr. Tucker said this fuel was being improperly burned and because of the high volatile content contrib-

uted materially to atmospheric pollution. He recommended the board of mayor and aldermen pass an ordinance not only to control smoke, but also an ordinance to control distribution of solid fuel.

A sample ordinance was then proposed to the city board calling for the creation of a department of air pollution with a commissioner, assistants, and an appeal board. The ordinance gave the commissioner almost dictatorial power over the air pollution program and stipulated that he be a trained engineer licensed by the state.

After Mr. Tucker's recommendations had been studied by the com-

mittee and the board, a member of the committee, D. W. Black, was sent to St. Louis to inspect the air pollution control program there.

On June 1, 1947, Mr. Black reported that the people of St. Louis were happy with their model smoke abatement ordinances.

The board, together with the *Kingsport Times-News*, then sponsored a mass meeting to discuss the air pollution problem in the city and to see if the citizens wanted to go along with the control. Sample ordinances were also sent to the major industries in Kingsport for their comments.

Three of the very plants in the city immediately approved modified dust and smoke control ordinances. These were Pennsylvania-Dixie Dixie Cement Company, Blue Ridge Glass Corporation and the Mead Corporation.

The Ordinance is Passed

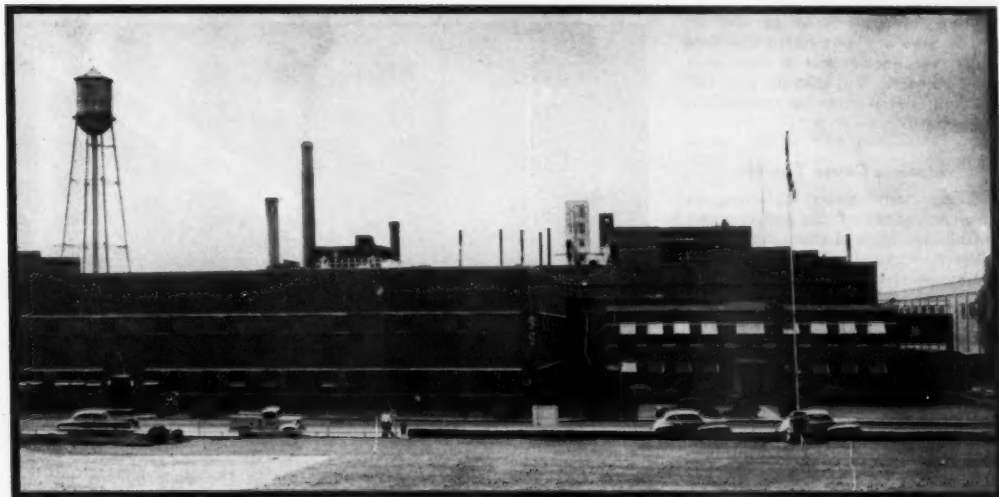
The board then drew up a referendum to submit to the voters to see if they favored an air pollution program. On September 8, 1947, the voters approved a referendum calling for anti-air pollution laws. After three readings before the board of mayor and aldermen, the proposal became law, effective June 1, 1948.

After the show of sentiment by the voters, other corporations endorsed the new law. These included Holliston Mills Paper Company, Kingsport Foundry and Manufac-



All photos courtesy Kingsport Times

- **BEFORE and after: Mead Corporation plant shown before (above) and after (below) air pollution control program.**



turing Corporation, Kingsport Press, Slip-Not Belting Corporation, Borden Mills, and the key to Kingsport's industry, Tennessee Eastman Corporation.

On January 9, 1948, in preparation for smoke control, the city employed Herbert A. Scruggs of Jefferson City, Mo., to head the newly created post of director of air pollution.

Holliston Mills Paper Company was the first to comply with the new ordinance. The steam plant at that firm was completed in March, 1948. It included two 284-hp boilers hooked in a series, a 150-foot smoke-stack, and water softener and coal storage systems. Fuel is supplied to the boilers by ram-type, underfeed stokers and an electric fan supplies an induced draft and over-fire air, insuring complete combustion with a minimum of smoke and fly ash. Ash from both units dumps into water-filled pits to prevent dust from escaping.

Coal handling equipment consists of a hopper where railroad cars are dumped, a crusher to reduce the fuel to uniform size, and a 200-ton storage silo. Coal is carried into the silo by a conveyor system and feeds to the stokers by gravity. The plant normally burns between 17 and 18 tons of fuel per day.

On the day the ordinances went into effect, City Manager D. W. Moulton briefly outlined the objectives of the program and called upon all citizens for cooperation for a cleaner and more beautiful city. "It became our duty as servants of the citizens of Kingsport to endeavor to enforce this ordinance effectively and impartially," he said.

"We have all been advised by those who are experts in the field that we cannot expect to clean up a city overnight, but that the pull will be long and it must be steady," he added.

Biscuits Cause Trouble

There were many violations in the early days of the enforcement of the law. Most of these came from citizens burning, and coal dealers selling, coal of a high volatile nature.

One reason given for violations was that as Kingsport is a southern city, the people like to have biscuits for breakfast. If they burn high volatile coal in their cook stoves, it gives a quick, hot fire which will heat their ovens to a high temperature necessary to bake biscuits. By using the specified low volatile coal, it takes them longer to heat their

ovens. This problem has been remedied to some degree by the use of compressed logs in place of coal in cook stoves.

In a test decision handed down by Judge Shelburne Ferguson of the 20th Judicial Circuit in Tennessee, it was held that the air pollution control ordinance did not exceed the authority granted in the Kingsport Charter.

The case arose out of a violation of the ordinance in that a coal dealer sold coal having a volatile content in excess of the 25 per cent allowed by the ordinance. A laboratory technician from Knoxville made an analysis of the coal sample for Director Scruggs and found its volatile content to be 48.14 per cent on a dry and ash-free basis.

The defendant's lawyers claimed the ordinance was void on the grounds that it gave no power to the city to outlaw the sale of (any) coal. This was overruled and Judge Ferguson again stated the ordinance was constitutional. The case was appealed to a higher court.

In a progress report in December, 1948, Director Scruggs said, "We have made as much progress on this job in six months as the city expected us to make in a year. In the six months period we have had 193 domestic corrections, six industrial and 20 commercial corrections. All of these were violators of the ordinance six months ago."

Director Scruggs said these were corrected without coercion and with the full cooperation of the Air Pollution Control Office.

Announcing his resignation which was to be effective on January 31,

1949, Director Scruggs said, "experts now consider Kingsport's progressive dust and smoke abatement program as one of the best in the country."

From March 1, 1947, until Director Scruggs resigned, work had begun on new installations, improvements, changes in firing procedures, etc., at such plants as Blue Ridge Glass, Borden Mills, General Products Corporation, Holliston Mills, Kingsport Press, Mead Corporation, Pet Dairies, and numerous other plants, including Clinchfield Railroad.

For example, at the Mead Corporation, the cost for installation of smoke and dust control equipment was \$1,412,000. The new features included a new set-up of six wood pulp digesters to replace ten other units; installations of new equipment to recover chemicals in escaping gases at the plant's lime kiln; construction of a recovery boiler; units to replace six coal-fired rotary burners; and installation of dust-collection equipment in the main boiler plant.

Two hundred and twenty eight corrections had been made toward the abatement of smoke and dust during the six months Director Scruggs remained in office. The program up to this point had never been a failure. Even though there had been many violations, neither the home owners, merchants, nor industrial plants were to blame. The fullest cooperation was given by the industrialists and the citizens of Kingsport in removing the smoke aggravation from the city.

(Continued on page 71)



● WHAT the visitor to Kingsport saw in the days before smoke control. Cooperation between industry and city eliminated this.

WHY MUNICIPAL ENGINEERING RECORDS ARE ESSENTIAL

JOSEPH LUSTIG,

City Engineer, Janesville, Wisc.

This is a portion of a paper by Mr. Lustig at a recent meeting of the League of Wisconsin Municipalities.

WHEN a community contemplates improvements such as sidewalks, sewers, water mains, curb and gutter or paving, the abutting property which is benefited by the improvement must share proportionately in its cost. In order to plan and carry out this work it is necessary that street and lot lines be determined by a competent engineer for the purpose of alignment and placement of the improvement and for a proper distribution of the cost of the work. This cost is usually distributed over the length of the improvement on a front foot basis as a measure of the benefit to the property affected. The data and field notes recorded by the engineer or surveyor in the determination of these street and lot lines constitute an essential engineering record for they will be referred to in all future subdivisions of land lying within the boundaries of these streets.

Street Grades

Before any street improvements such as paving or sidewalk can be initiated, it becomes necessary for the governing body to adopt a grade for the street. This grade must be shown on a profile drawing and must be certified to by the clerk of the village or city as being the legal or established grade of the street designated thereon. If, subsequent to the adoption of a grade on a street, an improvement such as a sidewalk or pavement were to be constructed whose grades, by reason of error or intent, were found to be radically different from the established grade of the street the community is vulnerable to suit for damages. Any property owner who can show that his property has suffered damage by reason of departure from an established grade

has a good chance to collect damages in a court action. Obviously, the drawings or profiles showing the established grades of streets constitute essential engineering records which will protect both the individual and the community if such a situation should arise.

Sewerage System Records

There comes a time in the development of every community when a sewer system is necessary. The smaller communities usually retain engineering firms which specialize in municipal work of this kind to prepare an over-all plan for a sewerage system. This plan will show the size of the pipes, depth and the grades of the sewers in each block. From this master plan the detail plans and profiles are prepared for such streets which from time to time may be improved with sewers by order of the governing body.

When this work has been completed the engineer will then furnish for record a set of plans which will show the depth, the location of the sewer with respect to street lines and street surface, the distance between manholes and what is most important of all, the measurements from the manholes to the capped openings in the sewer to which future house connections will be made. This record of house connection branches or "wyes" on a sewer line is most important. Should these records be lost or destroyed it would be very difficult, if not impossible, to make a proper connection to the main sewer. The depth of the sewer is also important information which is frequently needed to determine basement depths before starting the construction of a new building. Again it is quite obvious that the master plan for a sewer system together with the final measurements of the work all constitute essential municipal engineering records. In some smaller communities these have fallen into the wrong hands or have become lost or destroyed.

Water Utility Plans

Should the community own and operate its water utility it is very important that the master plan, if any, be on record and available for the planning of future new water main extensions. If the pipe system is one which has, like Topsy, just grown without a master plan or construction plans and without records of the underground system then, of course, we have Ole Knudsen to depend upon.

Ole Knudsen, the old water superintendent, knows the location of all of the water mains, tees, crosses and particularly the size and locations of all valves so no records are really necessary. When anything underground needs to be repaired Ole just digs down and always "hits her right on the button". When it comes to the finding of valves and their relation to other valves to shut off the water in a certain area, Ole knows just where to locate them, that is, fairly close at least. If in frozen ground Ole was a little off in his reckoning he just tried again and by golly twasn't more than 3 or 4 hours before the valves were all closed. Of course in the meantime a lot of water did do damage to merchandise in flooded basements and caused pavements to settle. Fortunately a fire didn't just happen to break out at this particular time. Yep, Ole always comes through after a fashion.

Sometimes Ole is very cooperative with the new city engineer who is trying to make a record of the existing mains and valves, their sizes and locations. By persistence and lots of digging all valves are located and measured with respect to street lines, and local objects. A master valve record book was then prepared and kept in the vault. All data relative to pipe sizes, locations of mains, etc., was gathered and recorded and then Ole "up and died". We know that Ole is now getting his reward in Valhalla for his assistance in preparing some essen-

tial engineering records. Too many small communities have a great investment in their local "Ole's" which will never pay dividends once he passes on without leaving behind him the important heritage of what he had in his head.

The above is intended to point out that all underground structures in a public street are important whether they be water mains, appurtenances, sewers, conduits or gas mains.

Storing Records

Small communities which feel they cannot afford to hire a city engineer usually turn over the records of engineering projects to their city clerk for safe keeping. With due respect to most of our publicly elected clerks the records have been preserved—after a fashion. Of course sometimes it may take them quite a while to dig out some important document or map and when found it may be a little mouse eaten or perhaps water stained but most of the information may still be legible. Not being engineers by training, and since in many cases the tenure of their office is limited, they cannot be expected to know nor to appreciate the value and importance of engineering field books, studies, maps and documents.

Over the years a community will acquire lands for various purposes, sometimes for streets or street widening or it may be for a right of way or easement for sewer purposes. Then again it may release land by the vacation of streets. Sometimes the deeds or easements of these acquisitions were recorded in the office of the register of deeds but frequently due to the inexperience of public officials this is not done. Tucked away in the vault there may repose a very important document which may affect future street or alley improvement work. Expensive litigation may result by reason of not having a complete and carefully documented record of all public lands and easements available to the engineer who plans public improvements in a community. Such a file then becomes an important engineering record.

Full Time Engineering Desirable

A well-governed community will see to it that a full time city engineer is hired just as soon as it can do so. Smaller communities can by the appointment of an engineer as director of public works assign to him numerous duties which will keep him more than busy. One of

the first things which he should undertake to do is to correlate all of the available engineering data and prepare an up-to-date city map showing streets and additions or subdivisions. For daily reference and use he should prepare a set of large scale maps in convenient sized sheets which show all of the available essential engineering information pertaining to municipal improvements on streets. To these maps he should add all new data and work as fast as it is obtained.

This set of maps will show:

1. addition and subdivisions—re-surveys of land with angles, distances and corner irons, street lines and block lengths.
2. street names and the house numbering system.
3. sidewalk and curb lines.
4. pavements.
5. sanitary sewers—location, sizes, depths, house connections, and wye branches.
6. storm sewers—location, sizes, depths.
7. water mains—location, sizes, valves, hydrants, etc.
8. gas mains—location and size.
9. public lands—easements and where recorded.
10. established shores lines on streams or lakes.
11. account number—for property identification.

To facilitate handling these maps, they should be prepared on conveniently sized sheets about 30" square and on good quality black line print paper properly bound on the edges. The master tracings from which these prints are made should be stored in a fireproof vault. They should be brought up to date each year so that a new set of prints containing the latest information will always be available for reference. The scale of these maps should be not less than 40 feet to the inch which will provide ample space in which to show all of the desired data.

In planning future improvements such a set of maps is invaluable for all pertinent information is available on one sheet and confliction of lines and grades will be more easily avoided. It must not be assumed, however, that such a set of maps as I have described is to be found in all up-to-date engineering departments. Quite frequently these various data are segregated in separate sets of maps and serve the purpose for which they are intended. If time and funds are available to combine this information on a single set of maps the work of

keeping up the records in the engineer's office may be greatly reduced. A well-organized and efficient city engineering department is the best investment that a community can make for it will then become the depository of essential engineering records which will at some time or other render valuable assistance to every citizen in the community. They are entitled to the protection which it can provide, and to complete and accurate information on any and all public improvements completed or contemplated. To the prospective home owner and builder such information may influence his selection of a piece of land and save him from a poor investment. A home owner having trouble with his sewer should be able to find out from the engineer's office whether or not his connection is of cast iron pipe or clay pipe. If his water pipe springs a leak he should be told whether or not his service pipe is of lead or iron. His plumber should also be given accurate measurements should it become necessary to dig down to a sewer or water service for repairs.

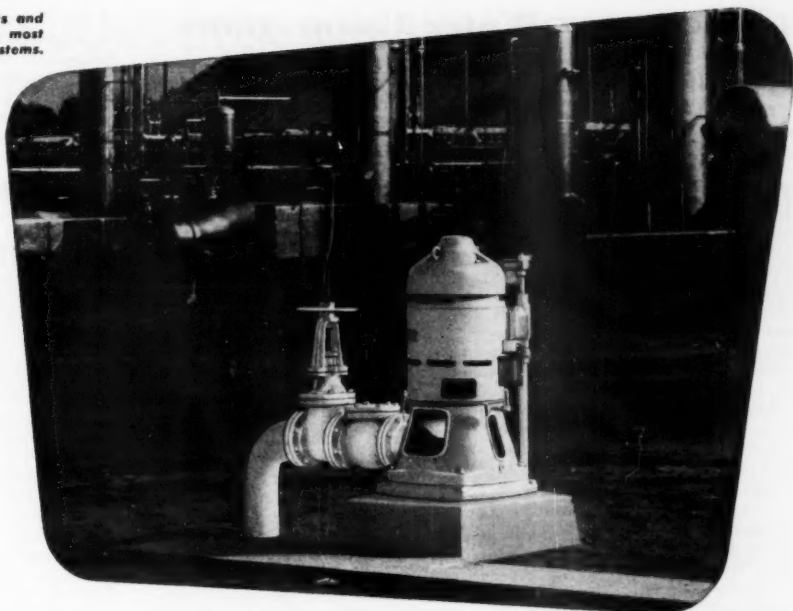
In addition to the records listed a well-organized city engineer's office should have on file the plans and specifications of all public buildings, photostat copies of all recorded plats of additions and subdivisions to and within the community, plans of all existing bridges and viaducts or structures of a similar nature, a large size colored map showing the zoning of the city as set forth in the zoning ordinance if such an ordinance exists, and a master street plan map showing the arrangement of the street system on all unplatted lands both within and without the corporate limits of the community. This master street plan must be preceded by topographical maps showing the contour of the unplatted lands.

In conclusion I will say again that no community however small can afford to get along without good engineering records properly kept by a competent person.

Snow Removal by an Excavating Scraper

Last year, Lewiston, Idaho, had one of the worst snow storms in its history. The City Engineer, W. P. Hughes, reports that an electrically controlled Tournapull, rented from a local firm, was exceptionally satisfactory in snow removal. Removal operations, using this machine, were conducted only at night, in order to avoid interference with traffic.

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Emergency Water Connections

A. V. AGNEW

This article is based on a paper presented at an Ohio Sectional Meeting of the AWWA.

THE word "emergency" is defined as "an unforeseen combination or circumstances which calls for immediate action." The "combination of circumstances" calling for emergency measures are many and varied. Only a few of the possibilities have been touched on, and these in themselves will suggest other, more extensive and no doubt better methods to obtain the desired end.

Emergencies affecting the ability of the Water Department to provide sufficient water during such times may be classified major and minor as follows: Major: Disasters due to war, plant explosion, plant fire, hurricane, earthquake, or conflagration. Minor: Break down of plant equipment, break in trunk main, over taxed plant due to excessive use by reason of prolonged dry spell, plugged intake by needle ice, or other cause.

In order to provide properly against a major disaster, (1) permanent intercity connections should be made where possible without excessive cost (2) Raw water bypass should be provided in the water plant.

Permanent intercity connections will involve a study of (a) pressure differentials; (b) pipe sizes and class; and (c) length of transmission lines.

Pressure differentials in the case of major disasters may be of little importance because it may be assumed that in the system affected the pressures may be zero or very low. In some instances it may be advisable to install booster pumps. In many communities it is possible, by laying short lengths of fire hose from adjacent hydrants on the separate systems, to boost the pressure sufficiently with the fire department pumper or pumpers as the occasion may demand.

A study of pipe sizes and class of pipe should be made to predetermine the pressure that may be safely used in the boosting process and to eliminate excessive friction losses. A reckless use of permanent or temporary booster pumps may defeat the purpose and make a bad situation worse.

The length of the transmission line from the point of emergency connection to the grid or dividing point must be known in advance for the

reasons outlined above. Flow studies should be made in advance to determine the amount of available water at the point of emergency connections. If such connections are to be made through fire hydrants such information is easily obtained.

The Raw Water By-Pass

In the event of a major disaster, it is of little importance that the water be treated. At such times water is of far more importance for its wetting qualities than for its thirst quenching ability. The public should be notified by every means possible that the water is not fit to drink and that it should be boiled before being used for human consumption.

Under this heading we may properly discuss emergency connections to industrial plants for the reason that it would be unusual to find an industry that would completely treat all of its water supply to meet the requirements of the Health Department. Since such permanent connections are not allowed under the rules of the Health Department provisions should be made for quick, short, easy connections between the private and the public supply.

Minor emergencies will normally be taken care of by restricted use of water by the consumer. However,

if the emergency is prolonged and to safeguard properly against fire, temporary connections with adjacent city systems may be necessary. I would not attempt to use industrial water, treated or not, under these conditions.

The same studies should be made for minor emergency connections that are made for major disasters.

Local Conditions

The situation of Lorain is especially fortunate, as it is surrounded by other municipal water systems. Tests were made at the potential connection points, using pumping engines and hose, where necessary, in order to determine under the conditions of pressure and length of line how much water could be furnished. On the basis of these tests it was determined that sufficient water was available; and also that certain permanent connections were desirable.

It is important that, in determining potential emergency supplies, the necessary tests and computations be made to ascertain how much water will be available under the conditions that actually exist. Valves should be closed and the interconnections actually made, by fire hose or other means, and the amount of water delivered should be measured or estimated by reliable means.

Water Supply Demand Factors

In discussing the water requirements for air conditioning equipment, R. A. Gonzalez of the Chrysler Airtemp Division, speaking before the Chesapeake Section of the AWWA, gave some interesting data resulting from a study of water usage in Dayton, Ohio.

MAJOR expansions in all phases of the Dayton water and sewer systems were held to a minimum in the 1930's because of economic conditions. The water pumped in 1940 was only 1% more than the water pumped in 1930 though the population increased 5% in that period. So there was no cause for alarm until the war years came along. Using 1940 pumping as a base, by 1944 the pumping was 153% of the 1940 pumping, whereas the population had increased by only 6%. Power consumption was up 41% and telephone instruments in use were up 52%. When 1945 pumping was less than 2% above 1944, there was reason to hope that a leveling off point had been reached. This proved a false hope.

By 1948, still using 1940 as a base, water pumping was up 95%; population was up 22%; power, 122%; and telephones 144%.

These population figures do not relate themselves to the water pumping so a search was made to find something that would relate fairly closely to it. It was found that the curves of power usage and telephone instruments in use closely paralleled the pumping curve. Thus there may be a close relation between rate of industrial activity and water consumption in Dayton. The 1949 pumping was about 5% below the 1948 pumping, and the 1950 pumping is currently running about 3% below the 1949 pumping.

Data have been gathered on the usage of water that can be attributed to air conditioning. The new air conditioning added in a year's time that would reflect on the 1948 pumping is estimated to have used 50 million gallons in a year that saw the pumping rise by 1210 million gallons. Thus, new air condi-

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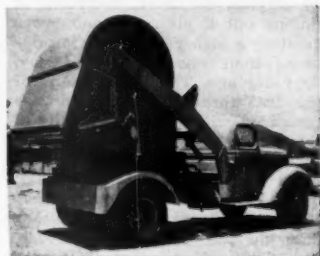
The Dempster-Dumpster System is, simply stated, one or more truck-mounted Dempster-Dumpsters, each with only one man, the driver, servicing any required number of detachable Dempster-Dumpster Containers, ranging in size up to 12 cu. yds. The Dempster-Dumpster makes scheduled calls at housing, market and business areas, hospitals, schools, etc. and picks up each pre-loaded container, hauls it to disposal area where contents are dumped automatically, then returns container to replace another pre-loaded container. This single truck-mounted Dempster-Dumpster services any number of containers, one after another.

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System Grows as Needed

The City of Birmingham started out with one Dempster-Dumpster and 10 containers in 1938. Now Birmingham has 12 Dempster-Dumpsters servicing 204 containers. Richmond, Va. started out with two Dempster-Dumpsters and 13 containers in 1946. Today Richmond has six Dempster-Dumpsters servicing 196 containers. And so on down the line in city after city where the Dempster-Dumpster System is saving sanitation departments thousands of dollars annually. For example, when Richmond replaced the conventional open truck method of bulk rubbish collection in the business area with the Dempster-Dumpster System it cut collection costs from \$1.03 to .43 per cubic yard.

The pay-load capacity of the larger Dempster-Dumpster Containers is equal to or greater than conventional truck bodies. It is important to remember that containers are available in many different designs of every desired size. For instance, where moist or wet rubbish is a problem, a Dempster-Dumpster container is built to



PICK UP AND HAULING OPERATIONS are shown in the two photos above. Driver backs Dempster-Dumpster up to Dempster-Dumpster Container, which has been pre-loaded by user, slips lifting chains onto lugs at each end of container, then, by hydraulic controls in the cab, lifts container into carrying position and drives to disposal area.

take care of it. And, bear in mind, regardless of the different designs or sizes of the containers you use at various points, one truck-mounted Dempster-Dumpster can service them all.

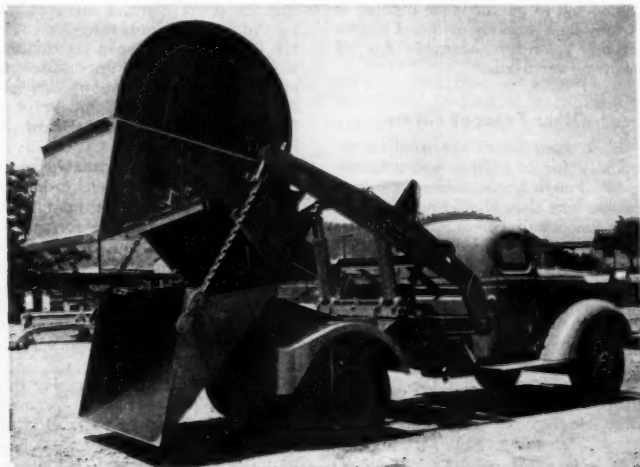
The Dempster-Dumpster System triples man-hour efficiency . . . reduces truck investment, gas, oil, maintenance costs . . . improves "housekeeping" methods . . . reduces fire hazards . . . provides an easier, quicker, safer and more effective manner of handling bulk trash and refuse.

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DUMPING POSITION of this 10 cu. yd. Apartment Type Dempster-Dumpster Container is shown above. Its payload capacity is greater than the average conventional truck body. Container is placed in dumping position hydraulically and drop bottom section of container is lowered for dumping . . . all under complete control of driver in the cab.

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tioning would account for only 4% of the increase, leaving a 96% increase attributable to other causes.

There is the matter of how much water per year is used by air conditioning. The best figures indicate the usage for water conditioning was less than 3% of the total 1948 pumping. So on the basis of annual water use, air conditioning is a small but measurable factor. In some cases, however, it is not the total usage, but the peak demand that is important. Here, the data indicate a maximum use of about 9% of the peak day pumping for air conditioning purposes. This sounds serious for it may produce heavy demands in localized areas. In Dayton, we were interested in finding out if air conditioning was creating a higher summer peak demand than was experienced, say, 20 years ago. The high months of the 1945 through 1949 years were compared with the high months of the 1925 to 1930 period. Surprisingly, the high months of the 1920 years when there was practically no air conditioning represent about 10% higher peaks for their years than do the years 1946 through 1949. This indicates that air conditioning cannot, in Dayton's case, be said to be causing an abnormally high summer peak demand.

Small Water Plants

(Continued from page 41)

place of the gravel layer considerably simplifies design.

The dirty water resulting from washing the sand bed is collected by wash water troughs. These are usually spaced 6 ft. apart, or 3 ft. from a side wall. This criterion may fix one dimension of the filter. The troughs are usually placed so that the overflow lip is slightly more than the distance above the sand bed of the wash water rise. If the rise is 30 ins., then the overflow lip of the troughs is a little greater than 30 ins. above the sand surface. This should be determined in cold weather when a greater rise will be obtained than in warm weather. It is difficult to design wash water troughs and it is recommended that they be purchased. Inflico and perhaps other manufacturers can supply them.

Controlling Operation

Basically, four pipes are necessary for filter operation. These (1) deliver coagulated and settled water to the filter; (2) deliver filtered water to the clear well; (3) bring wash water to the filter; and (4) remove the used or dirty wash

water. Best results in operation are obtained by filtration at a constant rate. To assure this a rate controller is necessary. This is usually of the venturi type. In addition, there must be easily controlled valves for shutting off the flow to the filters, the flow to the clear well, controlling the application of the wash water, and controlling the discharge of the waste. These controls are usually grouped on a single panel or table for easy operation. Such panels or tables can be furnished by several manufacturers complete and ready for installation.

Special consideration in design should be given to preventing contamination of finished water by raw or partly treated water or, in fact, by any other means. Waste lines should not be connected directly to sewers, but should be so constructed that backing up of the sewer into the plant is not possible. No conduit or basin containing finished water should have a common division wall with another conduit or basin carrying raw or partly treated water. The clear well or the finished water reservoir should be so located that no raw or partly treated water will pass over it.

Most small plants purchase power from local sources. Provision must be made for power failures unless finished water storage is sufficient for domestic consumption and fire protection as explained in the first article of this series. In most cases standby power will be needed. Local conditions and perhaps plant layout will determine how much and what kind of standby is needed. It may be merely a gasoline engine or engines connected to one or more pumps, or it may be a gasoline or diesel engine driven generator adequate for all plant power needs.

Other Types of Filters

Slow sand filters are used infrequently for municipal water treatment though there seems to be no reason why they should not be suitable for small communities where conditions are suitable for their use. They cannot handle turbid waters, and they require considerably more space and more labor for maintenance than the rapid type filter.

Pressure filters are the same in construction as the gravity type rapid filter except that the filter is enclosed in a metal shell. Though their use may permit elimination of repumping, they are rarely approved by state sanitary engineers for the treatment of surface water for public use. The continuous accurate control that is essential for

public water supplies can be obtained with pressure filters only with the most skilled and conscientious operation.

Diatomite filters employ diatomaceous earth as a filtering medium. The need for skilled operation and the possibility that, under certain conditions, unfiltered or partly filtered water may be passed have militated against their use for public water supplies. They have the advantages of a relatively high rate of filtration and the ability to produce a highly clarified water.

Pressure filters are made by Roberts, Permutit, Inflico, General Filter, American Water Softener, Bacharach, Graver, Cochrane and others. Diatomite filters are made by Proportioners, Bowser, Inflico, Permutit, Graver, Cochrane and others.

Operating Skills

Practically every state sanitary engineer contacted in the preparation of this article stressed the problem of obtaining suitable operating skills for the small plant. Some of these comments follows:

"In Michigan, we are convinced that a trained plant operator, capable of making chemical, bacteriological and physical tests, and interpreting results, is of prime importance in any plant, but particularly at the smaller plants. Trained personnel can save money in operation." Raymond J. Faust, Chief, Section on Water Supply, Michigan Dept. of Health.

"We think it would be worth while for consulting engineers to prepare a set of instructions covering the operation and maintenance procedures for plants they design. In the smaller plants, such instructions would be of great importance in obtaining good operation." Dwight F. Metzler, Chief Engineer and Director, Kansas State Board of Health.

"There is a limit to what a small community can pay. Operation is usually limited to one man with some possible assistance for emergencies. A man having an inquiring and analytical mind, a knowledge of machinery, dependability and integrity can develop into a good operator." W. W. Towne, formerly State Sanitary Engineer of South Dakota.

It may be desirable to employ the prospective operator as a foreman or inspector during construction of the plant. In watching the plant being built, he will acquire a familiarity with plant details and the working of equipment which he can obtain in no other way.

PUBLIC
WORKS

DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

SEWERAGE AND REFUSE . . .	55
HIGHWAYS AND AIRPORTS . . .	61
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THE SEWERAGE AND REFUSE DIGEST

Locating
Infiltration

In locating points of infiltration into sewers in Winchester, England, a trolley was constructed which was drawn through 9" sewers or larger. This carried four 2½-volt lamps operated by dry battery and enclosed in water-tight glass, which lighted up the interior of the pipe, a shield in front preventing the light from shining along the sewer. The section of the sewer above that under inspection was stopped off meantime. Quite accurate observations could be made for 60 ft. from each end of the section, or for a total length of 120 ft. between two man-holes. (How the remaining distance—presumably about 200 ft. in the middle of the section—was inspected is not stated. Probably the trolley was used but the result was less satisfactory). By measuring the length of towing cord when the trolley was at a point of infiltration, this point could be located very accurately.

John Gaskin—"Tracing Infiltration in Sewers;" *The Surveyor*, Nov. 24.

Irrigation with
Polluted Water

At a polluted irrigation water conference held at El Paso, Texas, attended by technicians from 5 western states, from the U. S. Public Health Service and 5 other U. S. Bureaus, and 4 state colleges, it was noted that, in the 17 western states approximately 30% of all crops come from irrigated land, these composing 50% of all vegetables and 60% of all fruits grown in this country. Reference was made to studies by Dr. W. L. Mallman, Prof. S. G.

Dunlop, and at Texas Western College and by the U. S. P. H. S. at Cincinnati. These appear to indicate that irrigation of certain crops with polluted water constitutes a serious health hazard, but no basic epidemiological data to confirm this are available. The final conclusions reached by the conference are summarized as follows:

1. Many phases of the problem were discussed by the speakers.

2. From the limited available epidemiological information, it appears that no major public health hazards have developed from present irrigation practices due largely to the vigilance and good practical supervision provided by health departments.

3. More research and studies are needed to develop methods which will permit further utilization of existing and potential irrigation waters. It is agreed that there is need for better indices of suitability of water for irrigation purposes, and that further investigation of this subject is essential.

4. The United States Public

Health Service should continue and expand its activity in stimulating and carrying out research in the entire field of irrigation water uses as related to public health.

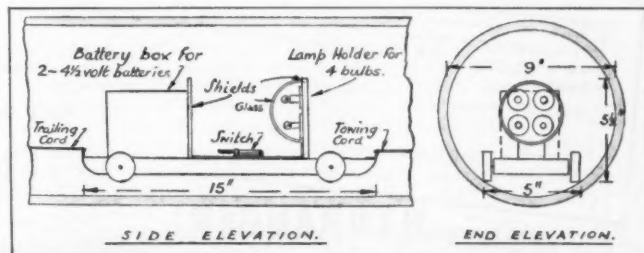
5. Industry should be further encouraged in the development and use of vegetable washing and sanitizing equipment.

6. It is recommended that the economics of using sewage effluents as irrigation waters be included in the studies of the overall problem.

Geo. W. Marx—"A Summary of Polluted Irrigation Water Studies;" *Bulletin of the Pan American Sanitary Bureau*, October.

Excavating a
Large Trench

Chicago is building a storm water relief system which includes 8,120 ft. of concrete sewer, ranging from 16.5 x 13.2 ft. (inside) to 8.5 x 8.5 ft., laid in a trench about 28 ft. deep. For excavating, the contractor had built for him a special backhoe for his 2½-yd. shovel, the boom being 32 ft. long and the dipper stick 17 ft. A longitudinal cut is



● METHOD of locating infiltration in sewers.

Courtesy The Surveyor

sawed through the concrete pavement 12 ft. each side of the center line; a drag shovel rips up the pavement and digs to a depth of 2½ ft.; the big backhoe travels in this shallow trench and excavates to a rough bottom grade; a front-end loader, working in the bottom, finishes the grading, pushing the material to within a reach of the backhoe. An average of 65 ft. of the largest sewer is completed each day, the backhoe operating two 9-hr. shifts, the other equipment one 9-hr. shift. Only two blocks are obstructed at a time, from sawing to backfilling. The trench is sheathed with 3 x 8 vertical sheathing, 6 x 8 horizontal wales and four tiers of 8 x 8 cross struts 6 ft. apart.

"Long-boomed Backhoe Digs Deep Trench;" *Engineering News-Record*, No. 23.

Biological Treatment Of Kraft Mill Wastes

Kraft mill waste, fortified with nitrogen and phosphate salts and seeded with organisms derived from the waste itself or developed from domestic sewage aerobic organisms, lends itself to biological oxidation using as little as 0.5 cu. ft. of air per gallon of waste per day. Using

suspended seed solids concentrations of approximately 200 ppm, it is possible to obtain BOD removals at 10 times the rate obtained with unfortified and unaerated kraft mill waste.

W. A. Moggio and H. W. Gehm—"Biological Treatment of Kraft Mill Wastes;" *Sewage and Industrial Wastes*, October.

Wastes to Fish Toxicity of

Under otherwise favorable conditions, pH values from 5.0 to 9.0, and strong wastes alkalies which do not raise the pH values well above 9.0, are not lethal for most fully developed fresh-water fishes. Solutions of ammonia, ammonium, hydroxide and ammonium salts can be very toxic, even as low as 2 to 7 ppm of ammonia. For such fish, the common strong mineral acids and some organic acids are directly lethal only when the pH is reduced below 5.0. A number of weak inorganic or organic acids can impart to some waters pronounced toxicity without lowering the pH as low as 5.0, this applying especially to hydrosulfuric, hypochlorous and hydrocyanic acids. Sensitive species of fresh-water fish may succumb rapidly to free CO₂ concentrations

between 100 and 200 ppm in the presence of much dissolved oxygen, and lower concentrations after prolonged exposure. The presence in polluted waters of more than a trace of hydrogen and other sulfides, free chlorine, chloramine, cyanogen chloride, carbon monoxide and ozone should be regarded as a possible hazard to fish life, some even in concentrations below 0.1 ppm.

Peter Doudoroff and Max Katz—"Toxicity of Industrial Wastes and Their Components to Fish;" *Sewage and Industrial Wastes*, November.

Elutriation in Dewatering Sludge

Gravity settling of fresh domestic sewage containing 180 ppm of settleable solids produces a plain sedimentation sludge with 19 lb. of water to each pound of solids. Vacuum filtering such sludge will produce a cake containing 3 lb. of water to each pound of solids. Vacuum filters have 2,000 times the capacity of sand beds per unit of area, but addition of chemical coagulants is necessary, ferric chloride being the cheapest; the doses varying from 12 lb. to 1 lb. per 1,000 persons daily, the latter for low vola-

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tile, well elutriated digested sludge. The coagulant requirement of the solids of a sludge is a function of the combustible organic matter, that of the liquid is a function of certain biochemical end products. The former requirement is considerably reduced by digestion, but this increases the liquid requirement, largely because of ammonium bicarbonate formation. Elutriation reduces the coagulant demand by improving the biochemical quality of the sludge water before chemicals are added, by dilution, sedimentation and decantation in water of lower alkalinity. Elutriation also eliminates ammonia odors and the use of lime in sludge conditioning. Fresh water is generally used for dilution in single-stage elutriation; but in two-stage, the decanted elutriate from the second stage is generally used for the first stage washing. The article gives step-by-step procedures for laboratory investigations.

A. L. Genter—"Elutriation: How It Aids in Dewatering Sludge," *PUBLIC WORKS*, December.

Field Laboratories In Water Pollution Surveys

The Sanitary Engineering Division of the Ohio Dept. of Health has been using a mobile laboratory since March 1, 1949 in its water pollution control program. This contains, in a 25 ft. trailer, laboratory equipment and supplies sufficient to make all usually required chemical, bacteriological and biological examinations. It carries an average field crew of 5 assistant engineers and engineering aids. "On the spot" analyses promote accuracy of results and saving in time and personnel. The laboratory makes more readily possible the observations of stream conditions at the most desirable times and frequencies. Bruce M. McDill—"Mobile Laboratory Survey of the Miami River."

The New York State Water Pollution Control Board is required to make studies of the sanitary conditions in 70,000 miles of streams and more than 3,000,000 acres of surface water. In its effort to accomplish this the Board uses a central laboratory for research and special examinations; and a mobile laboratory equipped for routine field investigations, a jeep and a row boat for sample collections and on-the-spot testing. The mobile laboratory, borrowed from the U.S.P.H.S. in September, 1949, is constructed on a house trailer chassis drawn by a

1.5-ton truck. One better adapted to this service has been designed and is being constructed.

Wallace W. Sanderson—"Operation of a Field Laboratory Unit in Water Pollution Surveys," *Sewage and Industrial Wastes*, November.

Sewage Treatment at Wilmington, Del.

Wilmington, Del., has completed designs for a plant to treat the sewage of the city and of all the surrounding county. In the county are several small plants which discharge into small streams flowing

into the Delaware river; which river receives the sewage of Wilmington. The average flow of the river provides a 300 to 1 dilution ratio and 40 to 1 at minimum flow, and primary treatment alone is required. However, it would be necessary to provide complete treatment for sewage discharged into the small streams, and this would cost more than to carry the sewage to a primary treatment plant at Wilmington. The present average sewage flow of the city of about 29 mgd is 27% domestic, 40% large industrial, 13% large commercial and 20% in-

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filtration, and is about 1/3 stronger than the average municipal sewage. The plant, designed for 40 mgd, will include primary settling, sludge digestion, elutriation, and digested sludge holding basins. The site is remotely located and near the center of hydraulic fill operations connected with river channel dredging. The sludge will be disposed of by discharge into 8 basins on the sandy soil of the hydraulic fill with a combined capacity of 8,000,000 cu. ft. It is expected that these will drain into the soil without special underdrainage features.

A. R. Vollmer — "Wilmington Plant Design Based on Studies;" *Sewage and Industrial Wastes Engineering*, December.

Sludge Elutriation At the Richmond-Sunset Plant

Elutriation has been in continuous use at this San Francisco plant since 1939 to reduce ferric chloride requirements, eliminate use of lime, and produce a sludge with uniform coagulating and dewatering characteristics. The system was designed for continuous flow, counter-current, two-stage elutriation at

the rate of 100 gpm of sludge to 300 gpm of wash water. For wash water, sterilized primary effluent is used. All sludge withdrawn from the digesters is elutriated; with two washings if to be vacuum filtered, but with only one washing for sludge from the primary digester that is to be transferred to the secondary. Elutriation is used also for removing suspended solids from the supernatant liquor. Elutriated sludge averages 4.5 to 5% total solids, regardless of the original solids content of the sludge. Alkalinity is reduced approximately 80%. In general, elutriation has not only fulfilled design expectations of reducing coagulant requirements and producing sludge with uniform coagulating and dewatering properties, but also has been utilized effectively in removing suspended solids from digester supernatant liquor. It has increased the flexibility of operation of the two-stage digestion system and shows promise of increasing its capacity.

Keeno Fraschina—"Sludge Elutriation at the Richmond-Sunset Plant, San Francisco, Calif.;" *Sewage and Industrial Wastes*, November.

Cincinnati's Sewerage Program

In doing its part in preventing pollution of the Ohio river, Cincinnati had an unusually difficult problem, in that 21 other municipalities and part of the county, all aggregating 214 sq. mi., drain to the river through the sewers of the city. This necessitated securing the agreement of these other communities to a plan for treating the sewage, under which each should pay its proper share of the construction and of the continuing operating cost. The actual study of the problem began in 1938 and a plan was prepared by consulting engineers. This included a recommendation that the construction and operation be financed by sewer service charges applied uniformly throughout the entire metropolitan area of service. This was adopted in 1948, with the further detail of issuing bonds for the construction from time to time as it proceeded, but setting the service charges sufficiently high at the beginning to enable the accumulation of a reserve to meet these costs as they were incurred progressively during the 8 or 10 years of the construction period. This was to avoid the irritations that would be caused by repeated increases in the rates should these be changed from time

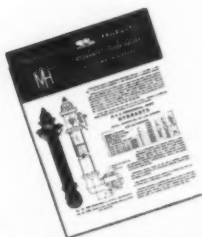


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to time as additional construction bonds were issued. It was not until December 1948 that the agreement was accepted by all the communities, except one village which decided to construct its own treatment plant. The service charges are added to the water bills, based on the quantity of water used. Delinquencies in payment of the combined charges have been no greater than before the sewer service charges were added. To provide for charges for treating industrial wastes, a tentative ordinance has been drafted which establishes characteristics of wastes that are prohibited from discharge into the sewers; limitations of certain characteristics, called "normal" sewage, excess of which must be paid for at fixed rates or the excesses be removed by pre-treatment at the point of origin. "Normal" sewage contains 300 ppm suspended solids, 240 ppm BOD, and 50 ppm grease; excess beyond these limits for SS and BOD may not be more than $2\frac{1}{2}$ times the normal even if paid for, and not beyond 200 ppm for grease.

In engineering features, the plan provides for four treatment plants, 8 miles of interceptor and 3 pump-

ing stations. Land has been acquired for the two most important plants, the interceptor for the Little Miami plant has been built and contracts for that plant have been let. This plant includes racks, detritors, chemical feeders and blowers, combined flocculation-settling tanks, sludge digestion tanks and gas equipment and gas holders, elutriation tanks, vacuum filters and sludge incinerators; capacity, 28.8 mgd.

Frank C. Tolles, A. B. Backherms and H. H. Kranz—"Sewage Disposal Program for Cincinnati and Vicinity;" *Sewage and Industrial Wastes*, November.

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Pavement for New Jersey Turnpike Designed for High Axle Loads. Nov. 23, Pp. 35-38.

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Reinforced Concrete Venturi Tubes Gage Sewage Flow Entering Treatment Plant. Nov. 23, P. 48.
Round-trip Pumping Cycle Rehabilitates Filter Media. Nov. 30, Pp. 33-35.
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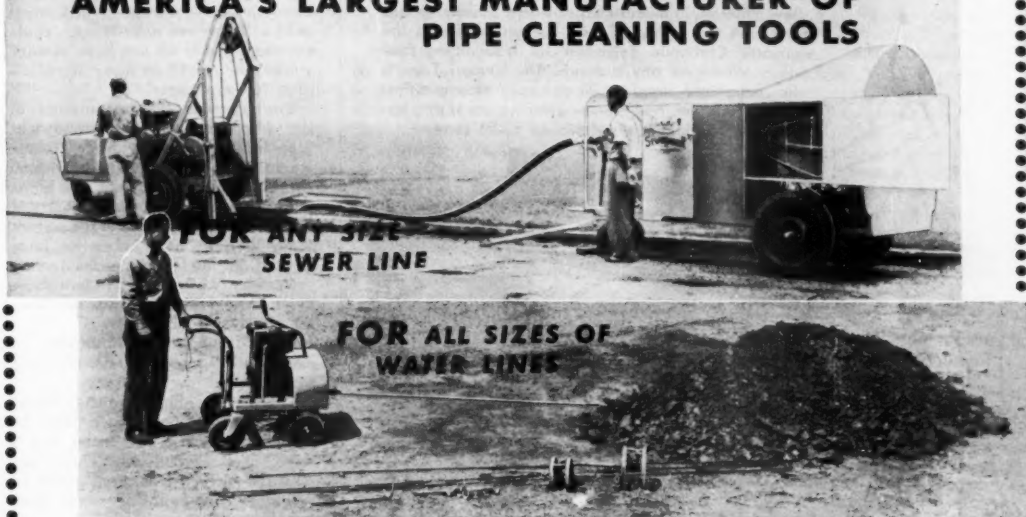
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 Nuclear Fission Operations and the Waste Treatment Plant Operator. By Geo. A. Rhame, San. Engr., S. C. Bd. of Health. November, Pp. 1494-1497.
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Alkalinity-Nitrogen Relationships in Sewage Treatment. By W. W. Eckenfelder, Jr., Chemist, and John W. Hood, Supt., Sew. Treat. Wks., Ridgewood, N. J. December, Pp. 507-510.
 A System of Balancing Oxidation-Reduction Equations. By Jerome F. Thomas, San. Engr. December, Pp. 511-512.
 Equilibrium Percolation Test for Designing Sewage Effluent Leaching Fields. By H. F. Ludwig, Assoc. Prof. of San. Eng., Univ. of Calif., W. D. Ward and W. T. O'Leary, students, and E. Pearl, Pub. Health Engr. December, Pp. 513-516.
 Sewage Works Design Requirements: Secondary Treatment. By Lawrence G. Rice, Cons. Engr. December, Pp. 517-521.

Small-Town Sewage Works in Georgia

During the 1935-1950 period, forty communities in Georgia of 750 or more population have financed and constructed sewage treatment works. There are now 41 such communities which do not have sewage works, though 15 of these are planning for sewerage.

The average 1930 population of the 40 towns with sewerage was 915; and of the 41 without sewerage works 884. The average population gain to 1950 was 451 for the communities with sewage works and 151 for those without sewerage. Since May, 1947, 27 new industries have located in the communities having sewerage, while only 7 industries have located in the group not having sewerage works.

In addition, 14 communities of less than 750 population are planning sewerage.

There were only 16 sewage treatment plants in Georgia in 1930. Of these 8 have been replaced and 2 have been remodeled. There are now 100 sewage treatment plants in the state, not counting septic tank installations.

These data are from an excellent report of the Water Pollution Control Division of the Georgia Department of Health. In addition to much other interesting data, this report lists and describes briefly all of the sewage treatment plants in Georgia.

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Channelized Intersections at Boise

In remedying traffic conditions at three bad bottlenecks, Boise, Ida., used channelizing. The worst was where the city's main street, Vista Ave., dead-ends into U. S. Highway 30, which a few feet beyond runs into another main thoroughfare. An underpass was considered too expensive, and a stop light system not flexible enough to allow for changes in traffic flow from hour to hour. In developing a channelization layout, the traffic officer utilized the record of traffic mishaps, an extensive traffic count, and pictures of wheel tracks in newly fallen snow. He decided that 4 lanes at the junction of Highway 30 and Vista Ave. were necessary. These were made 12 ft. wide (to be converted later to 15 ft. by widening), so separated that cars could not pass easily from one to another. For economy and to permit future changing, the divisions between lanes were made by means of Armco guard rails, laid flat on the pavement and fastened down by 12" bolts driven through the flanges into the asphaltic concrete. These guard rails are corrugated, with the ridges 3" high, which made crossing them unpleasant but possible. These were placed late in 1949. Since then

the accident rate has fallen to the lowest point in years, with no accident attributable to the guard rail channels. Plans are under way to replace the rails with a concrete curb 3" high.

H. K. Glidden—"Novel Channelizing Saves Expensive Intersection Changes at Boise;" *Roads and Streets*, November.

Photogrammetry in Locating a Turnpike

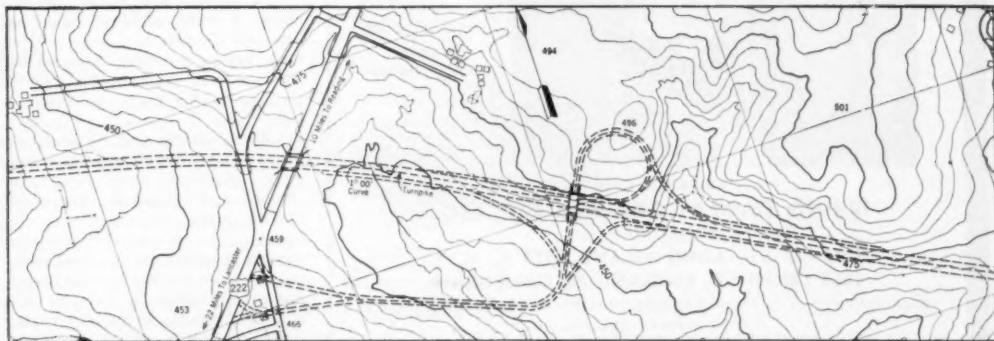
One of the most extensive applications of aerial mapping to date was the location of 208 miles of the Pennsylvania Turnpike extensions. All the preliminary line and grade studies, interchange layouts, grade separation studies, quantity estimates and cost estimates were based on topographic maps produced by photogrammetric methods, for which a contract was let to the Aero Service Corp. of Philadelphia, at about \$1.00 per acre for one 140-mile section and \$1.29 for the other 68 miles. This provided for a map with 5 ft. contours, on a scale of 1" = 200 ft. covering an area 1 mile wide, with no error in elevation exceeding $\frac{1}{2}$ a contour interval for 90% of the elevations, nor exceeding one contour interval for the remaining 10%; and horizontal distances with-

in 1/20" (map scale) of their true coordinate position. Elevation accuracy was checked by preparing a profile, by leveling on the ground, of a 3,000 ft. tangent and comparing it with a similar profile prepared from the contour map. The cost was much less than that of a ground survey would have been; and completed maps of the 208 miles were delivered in 215 days—nearly a square mile a day, effecting a great saving in time.

Frank J. Williams—"Photogrammetry Locates 208 Miles of Pennsylvania Turnpike Extension;" *Civil Engineering*, December.

Base Construction Using Calcium Chloride

Knox County, Tennessee, in improving macadam roads, constructs the bases with limestone, crushed in its own six quarries, with calcium chloride added. The old macadam averages 2" depth of usable material. If this is in suitable condition, the new base material is placed directly upon it; otherwise the existing macadam is scarified and new material added, crowned and rolled, and a second lift placed on this. In construction, the coarse aggregate is distributed uniformly, limestone dust added, then calcium chloride



Courtesy Civil Engineering

● SECTION of contour map on which preliminary location has been sketched.

at the uniform rate of 1 lb. per sq. yd. per 3" of lift. These materials are bladed to a uniform mixture, adding water if necessary, and then windrowed and left for about 2 days to cure. Then it is again mixed by blading, leveled to the proper grade, and rolled with 8 or 10-ton 3-wheel rollers. Comparison with work done without use of calcium chloride has shown that, when it is used, greater density is obtained with half the rolling, mixing with 2/3 as much blading, and considerably less watering is necessary both during construction, and afterward to prevent formation of corrugations and pot holes.

T. D. Williams — "Better Bases Made by Stabilizing with Calcium Chloride;" *PUBLIC WORKS*, December.

Bituminous Carpets in England

"Few people, laymen as well as engineers, will disagree with the view that the laying of bituminous carpets by Barber-Greene machines is the most noteworthy feature of post-war highway engineering in this country (England). The smooth riding qualities which are produced by mechanical finishers are most ob-

vious and the improved surfaces so obtained have helped to deceive the traveling public as to the lack of other work being carried out on our roads. . . The author is of the opinion that if mechanical finishers had not been introduced into this country, many of the hundreds of miles of carpets at present in existence would never have been laid." It is a controversial question how much the carpet, when laid with a Barber-Greene machine, can eliminate surface irregularities on the existing road. The author believes that it is best first to make the subsurface as true as is reasonably practicable before laying the carpet.

A. S. Turner — "Some Carpet Problems;" *The Surveyor*, Nov. 3.

Reconstructing an Old Concrete Road

U. S. 41, between Chicago and Milwaukee is a 4-lane highway built during the 30's, on which traffic averages over 12,000 vehicles daily, many of them heavier than the pavement was designed for, which condition has caused extensive failure. In 1950, two 3½-mile reconstruction jobs were completed at a location where the worst condition existed. In performing this reconstruction, the existing 20-ft.

concrete slab was broken up into pieces none larger than 15", rolled thoroughly; and covered with an 8" x 22' lean concrete overlay slab, laid without any reinforcement or joints except a longitudinal dummy joint 2½" deep. On this was laid 3½" of asphaltic concrete. This raised the grade about 11". At road intersections the old concrete was removed for a short distance to bring the grades of the two roads together. Breaking was performed by one contractor with a drop-hammer Novo unit breaking a 3½-ft. width, and a RPB breaker mounted to work in a 10 ft. arc. The other contractor used two RPB units. For rolling, one contractor used a tandem steel roller and a pneumatic roller; the other used a ballasted steel roller and towing tractor.

"Repaving for Very Severe Conditions;" *Roads and Streets*, November.

Traffic Signals On Ohio Highways

On July 1, 1950 there were 208 signalized intersections on Ohio's highways, and 31 on the list to be installed. In deciding where signals should be installed, the Dept. of Highways obtains the following facts: Vehicle volume counts (including turns), pedestrian volume counts, speeds and classification of vehicles, layout details (roadway width, grades, sight distances, etc.), details of accidents. The Chief Engr. of Traffic says: "The installation of a traffic signal not warranted on a factual basis, or a signal improperly operated or poorly maintained, may operate to the definite disadvantage of vehicular or pedestrian traffic."

Traffic signals in Ohio are of two types—fixed-time and traffic-actuated, with the trend toward the latter. There are eight different types of traffic-actuated signal operations on state highways in Ohio, each having a definite purpose and selected to fit the variations in traffic flow at the particular intersection.

All the state's traffic signals are installed and maintained by a state crew provided with a 2½-ton chassis with hydraulic tower lift, derrick, winch, air compressor, and tools; a 1½-ton truck with revolving aerial ladder, derrick and power winch; a ¾-ton truck with revolving aerial ladder; a trencher with a backfill blade; 2 pick-up trucks; 2 pole and carry-all trailers; 2 pipe pushers; a sedan and a station wagon. For maintenance, each of

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the 12 highway divisions is responsible for the periodic inspection and routine maintenance of the signals in that division, and is equipped with a pick up truck provided with a ladder.

Harry E. Neal—"Traffic Signal Installation and Maintenance by Ohio Highway Department"; *Roads and Streets*, November.

Traffic on Rural Roads

Total travel on rural roads in 1949 broke all records, exceeding the 1948 previous high by 7 percent and the prewar peak by 27 percent. On the 350,000 miles of main rural roads in the United States, travel in 1949 was over 159 billion vehicle-miles, of which 78 percent was by passenger cars, 1 percent were buses and 21 by freight-carrying vehicles.

Trucks and combinations hauled 7 percent more ton-mileage of freight in 1949 than in 1948 and 52 percent more than in 1941, the increase resulting largely from greater use of heavier vehicles. Truck-combination travel was 10 percent higher than in 1948, 85 percent higher than in 1941, and 244 percent higher than in 1936. Comparable figures for single-unit trucks were 5, 27, and 92 percent. The average carried load for all trucks and combinations in 1949 was 2, 40, and 76 percent above the averages in 1948, 1941, and 1936, respectively.

In 1949 more than 5 percent of all trucks and combinations exceeded a State legal weight limit, and 16 percent of the combinations were illegally overloaded in some particular. In comparison with 1948, the percentage of overweight vehicles decreased slightly in 1949 except in the western States.

Thomas B. Dimmick — "Traffic Trends on Rural Roads in 1949;" *Public Roads*, December.

Rubber in Pavements

During the past three years a number of sections of road have been laid by state highway departments and others in which asphalt combined with rubber was used. These included tests of natural rubber, a synthetic rubber and reclaimed rubber, in quantities varying from 1 to 15% of the asphalt used. The immediate results have been so encouraging as to warrant further study. What the effect of time will be—whether, as some claim, rubber will double the life of an asphalt pavement—can not yet

be known with certainty. However, pavements containing rubber laid in Holland between 1929 and 1940 have proved so long-lived as to encourage the continued study. Rubber is found to decrease the ductility and flow of the mix and raise the softening point, reducing creeping and bleeding. It apparently increases skid resistance, and rubber-asphalt pavements retain the skid-resistance longer than those without rubber. The cost is of course greater—estimates of the excess cost range from \$1,000 to \$3,000 per mile of 24-ft. highway for a 1½" top. There are no construction difficulties, although the methods used in these test roads have increased the mixing time slightly.

V. T. Boughton—"What About Rubber in Pavements?"; *Engineering News-Record*, Dec. 7.

Striping Black-Top Roads

Highway officials of 10 counties in 8 states, from California to New York, answered a questionnaire on this subject. Some thought every bituminous road should be center striped; others confined it to those carrying heavy traffic. Several re-

marked on its special advantages in stormy or foggy weather. All but one believed that it reduced accidents; and this one also said that it tended to divert traffic to the outer edge of the pavement, where it did the most damage, while others said striping kept traffic away from the outer edge. One Michigan superintendent said "Our records prove conclusively that center striping does reduce the number of accidents on all types of roads." In one California county, some roads with traffic counts as low as 12 cars daily are center-striped because subject to dense fogs.

Several counties use a dashed line instead of a solid one to economize on paint. Several use glass beads; one uses a paint with glass beads already mixed in it and in addition spreads beads on top to serve while traffic wears the paint from the top of the mixed-in beads. One county, on freshly sealed surfaces, first places a 6" stripe of tar paint and on this a 4" stripe of white beaded paint. Costs of striping are given by one county as \$50 per mile, using glass beads; by another as \$30 for paint alone for a dashed line. A California county lets the painting by contract for \$35 a mile

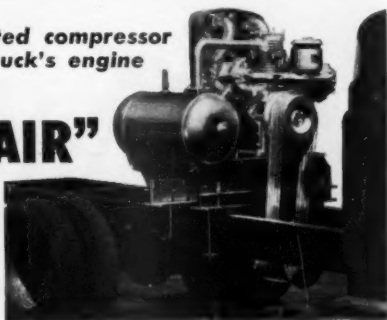
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for a 4" dashed line, including everything, and finds this very satisfactory.

"Center-Stripe Black-Top Surfaces?"; *Better Roads*, November.

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New Check on Traffic Flow. November, P. 34.

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Photogrammetry Locates 208 Miles of Pennsylvania Turnpike Extensions. By Frank J. Williams, Cons. Engr. December, Pp. 23-25.

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Mobile Minutemen Maintain Florida's Bridges. By E. C. De Garmo, Maint. Engr., State Rd. Dept. November, Pp. 75, 78.

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Flame-Photometer Determination of Sodium and Potassium in Soils and Other Siliceous Materials. By W. J. Halstead, Chemist, B.P.R. December, Pp. 99-104.

Public Works

Corner "Islands" on Daytona Streets. By Guy Browning Arthur. December, Pp. 39-40.
Building a Floating Road. December, P. 41.
Modern Lighting System for a Municipal Airport. By Wm. P. Hughes, City Engr., Lewiston, Idaho. December, Pp. 47-48.
Design and Control of Air-Entrained Concrete Mixtures. December, Pp. 48-50.
Better Bases Made by Stabilizing with Calcium Chloride. By T. D. Williams, Engr. Knox Co., Tenn. December, Pp. 61, 62, 64.

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A Study of the Performance of Plant for the Compaction of Soil. By F. H. P. Williams and D. J. MacLean, British Road Research Laboratory. November, Pp. 74-76, 90.

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Repaving for Very Severe Conditions. November, Pp. 33-37.
"Highball" Method Speeds Clearing. November, Pp. 40-41.
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South African Municipal Magazine

New Uses for Rubber in Asphalt Surfaces. October, Pp. 15-21.

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What About Rubber in Pavements? By P. T. Boughton, Assoc. Editor. Dec. 7, Pp. 34-38.

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Some Carpet Problems. By A. S. Turner, Deputy County Surveyor. Somerset. Nov. 3, Pp. 547-548.

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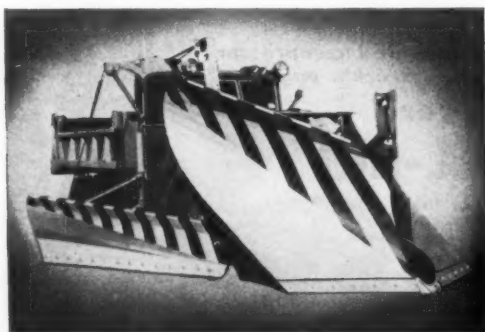
The Problem of Clay in Road Construction. By D. J. MacLean. Nov. 15, Pp. 22-28.

Weed Control and Land Sterilization at an Airport

Since all seeded areas around the Lewiston-Nez Perce County Airport had become weed infested, and the grass was not able to maintain itself in some places, the entire landing area was sprayed with 2,4-D. A remarkable weed kill was obtained. The total cost was \$263.52. An important product of this work was the fact that men were made available for other work, since mowing of weeds was no longer necessary.

It was also found desirable to remove vegetation from the areas around the field lights. In order to avoid damage to underground wiring, the University of Idaho was requested to conduct experiments to determine the effects that soil sterilizing chemicals would have. There are no indications that any damage to the wiring would result, so chemicals will probably be used for sterilization.

These data are from the excellent report of W. P. Hughes, City Engineer of Lewiston, Idaho.



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Requirements for Off-street Parking

More cities are requiring off-street parking facilities for apartments, theaters, stores, and hotels. New York City now requires that parking space must be provided with nearly all types of housing construction in the future. Apartment houses of more than 40 units erected in densely populated areas must have garage or parking space equal to one-fifth the number of units. In other areas the car space must equal 30 to 50 per cent of the number of apartments. Parking space may be enclosed or in the open, but the open space must be where a garage may be legally erected. The storage space may be provided other than on the lot where the dwelling is erected, but if the parking area is in the same ownership as the apartment building, it cannot be more than 1,000 feet away.

Louisville, Kentucky, is considering a comprehensive off-street parking ordinance. All new apartments, schools, churches, retail stores, and many other types of buildings have to provide off-street parking facilities either on the premises or within 1,000 feet of the building entrance. Examples of the parking spaces that would be required include: one or two family dwellings and multifamily dwellings—one space per dwelling unit; apartments—two spaces for each three dwelling units; hotels or rooming houses, clubs and fraternity houses—one space for each three rooms or suite; auditoriums, theaters, gyms, stadiums—one space for each five seats or bench seating space; churches—one space for each five pew seats; dance halls, skating rinks, and places of private or public assemblage—one space for each 100 square feet of floor area; retail stores—three spaces per 1,000 square feet of floor area.

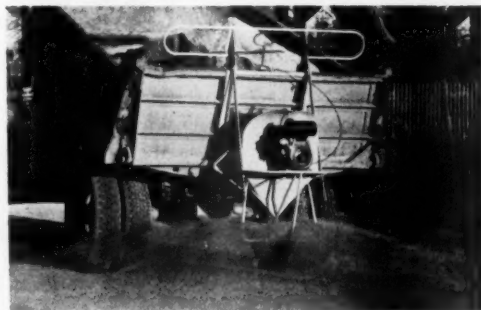
Berlin, Connecticut, recently added off-street parking requirements to its zoning ordinance. The ordinance requires theaters to provide one parking space for each six seats; restaurants, night clubs, taverns, or dance halls, one car space for each 150 square feet of public floor space; retail and commercial establishments one parking space for each 250 feet of ground floor area of a retail store or office building and one additional space for each 500 square feet of floor area above the ground floor. Theaters, bowling alleys, night clubs and other establishments that carry on most of their business at night need provide only 50 per cent of the parking area normally required if the balance of the required space is obtained by using areas provided by businesses conducting most of their activities during the day. Public Management.

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PUBLIC WORKS

DIGESTS

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Actinomycetes And Tastes and Odors

The actinomycetes, or ray fungi, are a group of organisms that are closely related to the bacteria and the fungi. Information obtained by the authors from 15 yrs. of investigating Southwest, rivers, streams and reservoirs led them to conclude that the odors attributed to algae by many investigators were probably not produced by the algae, as previously assumed, but were produced from the algae by an intruding form. This intruder has been identified as a group of actinomycetes, *Streptomyces*, which is only one genus in a great array of organisms that may destroy not only algae but many types of aquatic and terrestrial vegetation and produce a myriad of chemical compounds.

J. K. G. Silvey, J. C. Russell, D. R. Redden and W. C. McCormick—"Actinomycetes and Common Tastes and Odors"; *Journal, American Water Works Ass'n*, November.

Hazards from Chemical Contamination

Toxic elements in water introduce the feature of possible accumulation of them in body tissues; so that, while a single dose or the ingestion of a single day may be harmless, if the amount of toxic element taken into the body exceeds the body's ability to excrete it, there will be a gradual accumulation, which may result in a mild and insidious type of chronic poisoning, difficult to recognize or diagnose. There is a wide variation in the tendency of various toxic elements to accumulate in the body, and also in the sensitivity of different persons to such poisons. Safe limits of different toxic materials can be learned only by observation of actual cases. From such observations (although the number of them is far too limited) it has been learned that drinking water containing 1 ppm of lead eventually causes symptoms of lead poisoning,

and 0.1 of this is the accepted limit for lead content of water. Limits of 1.5 ppm for fluorine and 0.05 ppm for arsenic have been established similarly. Other toxic substances that may be found in drinking water are selenites, cyanides, chromates, cadmium, sodium, iron, aluminum, manganese, copper and zinc. The last five are so little toxic as hardly to warrant consideration. Some persons should refrain from drinking water high in sodium salts. For chromates, the U.S.P.H.S. standard of 0.05 ppm of hexavalent chromium seems amply safe—possibly unnecessarily so. For cadmium, no data are available adequate for fixing safe limits.

C. W. Muehlberger—"Possible Hazards from Chemical Contamination in Water Supplies"; *Journal, American Water Works Ass'n*, November.

Suburban Water Rates

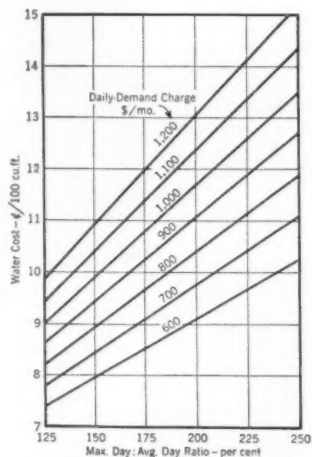
The municipal water works of Kansas City, Mo., serves 135,000 people living outside the city, this

water being bought wholesale by private and public utilities, which distribute it. The rates charged to these utilities have three additive parts: 1—a monthly charge based on the distance from the main pumping stations, and proportional to the maximum day's demand during June to September; 2—a monthly distance charge proportional to the excess of the maximum hour's demand over the maximum day's demand; and 3—a charge based on the quantity of water used. It was calculated that 25% of the total cost of serving the suburbs was fixed charges on the trunk mains. The excess hourly-demand charge is avoided by those utilities which provide storage to meet peak-hour requirements. The maximum hourly and daily demands are ascertained by means of a recorder on the water meters through which water is sold to the utilities, using 24-hr. charts.

Melvin P. Hatcher—"Distance and Demand Factors in Suburban Water Rates"; *Journal, American Water Works Ass'n*, November.

Renewing Filter Media

In rehabilitating 40 filters, each with two 50 x 14 ft. sections, built in 1926 at Buffalo, N. Y., the contractor removed gravel and sand with a total depth of 3.58 ft., of which 3,700 tons was gravel in five grades, and 6,100 tons was sand. The sand was discarded; the gravel was cleaned and regraded by means of vibrating screens, and replaced in four layers. Each layer was leveled off by filling the tank with water up to the desired level of that layer, using the water level as a guide. Then the whole was covered with 26" of new sand. The original sand and gravel were removed by means of a 6" centrifugal pump, plenty of water being run into the filter box meantime. The screened gravel was pumped back into the filter by a similar pump, deposited there in piles, knocked down by high-pressure hosing, and

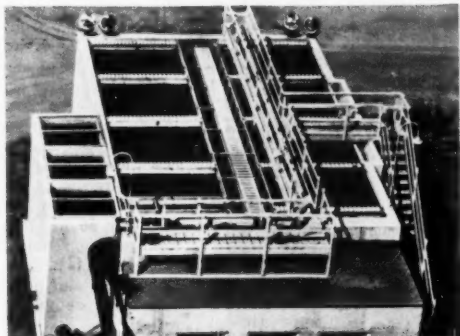


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smoothed to water level by hand. The new sand was pumped 800 ft. from a railroad siding into the filter.

"Round-Trip Pumping Cycle Rehabilitates Filter Media"; *Engineering News-Record*, Nov. 30.

Iron and Manganese Removal by Pressure Filters

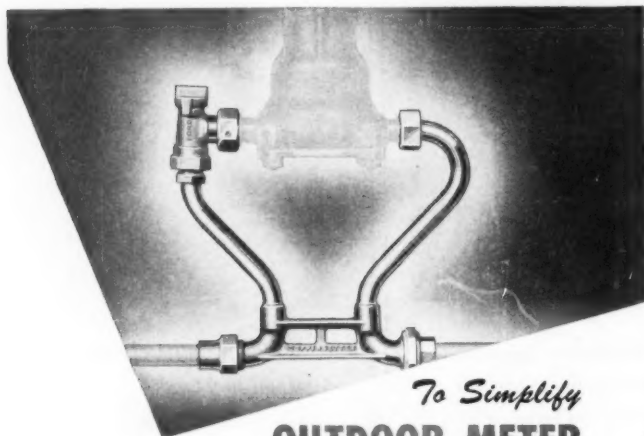
The Jamaica Water Supply Co. serves approximately 475,000 population on Long Island, N. Y., with water from 48 wells. The water from all the wells contains iron and magnesia in different amounts. Prior to 1949 a 5 mgd treatment

plant consisting of aeration, chlorination and gravity filtration, and a 2 mgd plant consisting of pressure filters containing a 48" depth of sand and calcite filtering medium, treated part of the supply. The iron and manganese content of the water from four wells not treated was 0.64 and 0.22 ppm, respectively, and a new plant for treating this was installed in 1949-1950. For this, four processes were considered—gravity filtration, requiring double pumping; a potassium permanganate pressure plant; a lava and sand calcite pressure filter; and a

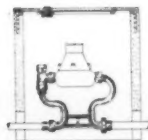
fine sand pressure filter with shallow sand bed and low filter rates and pressure losses. A pilot plant was operated to test the last-named. Tests using a filter with 1.0 mm sand and one with 0.5 mm sand, operated both separately and in series, indicated that double filtration was unnecessary and that 15" of 0.5 mm sand, using 0.8 ppm of chlorine and 10.6 ppm of lime, would reduce the iron to 0.04 ppm and the manganese to 0.07 ppm. If the lime was increased to 13.0 ppm, the iron was reduced to 0.05 ppm and the manganese to 0.02, but the pH was increased from 7.9 to 8.3. In each case there was 0.09 ppm or more of residual chlorine.

The new plant contains 8 Cochrane vertical pressure filters 12 ft. in diameter, designed for a rate of 4 gal. per sq. ft. per min. The head loss through the entire plant when filtering at that rate remains below 4 ft. for 32 hr. and below 6 ft. for 56 hr. It was found that iron can be removed by air alone, but lime is beneficial to remove the manganese and provide the pH required to deliver a non-corrosive water.

Reid Hobson and Peter Ley—"Design for Economic and Efficient Pressure Filtration"; *PUBLIC WORKS*, December.



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Blending a Water Supply

Bartlesville, Okla., population about 20,000, has drawn its water supply since 1904 from the Caney river. Since 1915 the oil development on the watershed has resulted in brine reaching the river in such quantities as to cause a salinity as chlorides ranging from 22 to 2310 ppm, averaging 288 ppm. As 200 ppm is considered the limit of tolerance for public water supplies, a remedy was desirable. It was calculated that reducing the mineral content of the river water by ion exchange would cost \$286 a day for operation. The plan adopted was to develop an impounded supply by constructing a dam 5 miles from the city. This supply has a salinity of 75 ppm, and by mixing this with the present river water in proportions varying from 0 to 98% of the combined supply, averaging about 26% the salinity could be kept below 220 ppm. The impounded supply is softer and less turbid than the river water, does not require low-service pumping as the river does, and has a safe capacity of 1.5 mgd. It is probable that use of the river water will be limited to peak

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periods for several years at least.

W. L. Patterson—"Selective Use of Raw Water at Bartlesville, Okla.," *Water & Sewage Works*, December.

Determining Water Rates

The problem of establishing a basic theory for determining water rates and developing a formula based upon such rates has been discussed by water works officials for many years, but without developing one that received general approval. The A.W.W.A. has a Committee on Water Rates, and at the last Annual Conference the chairman of this committee presented his tentative conclusions; which, as always in the past, produced discussions which rebutted several of the ideas advocated. Very greatly condensed, the ideas presented by the chairman were as follows:

The basic problems are: 1. How much revenue should a water works receive? 2. In what proportions should this gross revenue be collected (a) from property assessments and (b) through utility rates? 3. Should utility rates incorporate a "demand" or "ready-to-serve" charge; and if so, upon what logi-

cal basis should the amount of such a charge be fixed? 4. If a demand charge is to be used, upon what basis should it be distributed to customers? 5. How many steps are desirable in the commodity rate, and what are the logical rules for fixing the step quantity limitations and the unit rate for each step?

The revenue requirements for public systems may be considered under two heads: *Basic*—operation and maintenance; debt payments; and reserves for replacements and for normal extensions and improvements; and *Optional*—taxes, reserves for major improvements, and contributions to other city departments. Concerning taxes, there seems to be agreement that taxes should not be included unless adequate payment is made to the utility for fire protection and all free service. As for contributions, only to the extent that waterworks debt-free property has been paid for by taxpayers can one justify a "dividend" to taxpayers on such property.

The author apparently endorses the general plan of the Washington Suburban San. Dist. for allocation of revenue, which includes a general tax on all property based on

assessed valuation; a front-foot benefit charge, where there is a main in front of a lot, whether used or not; and a ready-to-serve charge and consumption charge when water is used. Charging for fire protection is generally considered logical, but only about 38% of the publicly owned plants make any such charge, and this varies from 1.5 cts to \$4.20 per capita per yr. As a basis for calculating such charge, some assume that it should give a return on the excess cost of a plant affording protection over that of one meeting all requirements except fire protection; others would allocate the total revenue to normal use and fire protection, respectively, on the ratio of the estimated cost of a system for fire protection only to that of one for general service only. The author advocates the former, basing the excess plant capacity required for fire on the fire demand for water as based on the standard requirements of the National Bd. of Fire Underwriters; the application of which idea is explained in detail.

Discussing the rate structure, the author rejects the demand charge, and recommends a service charge which would include all commer-

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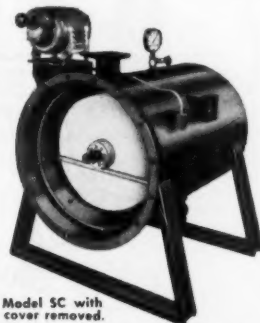
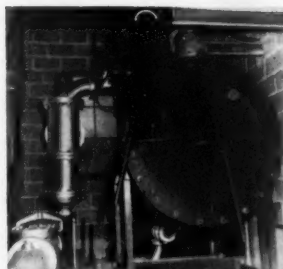
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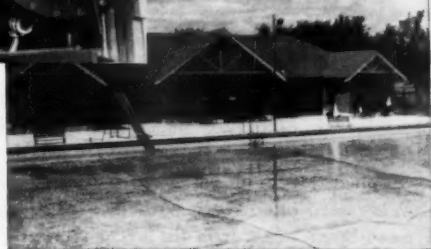
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cial expense and part of the administrative and overhead, divided equally among all accounts; and all expense arising out of meters and services, and part of the administrative and overhead, distributed on the basis of meter costs. Also there should be a minimum charge based on the commodity rates. For commodity rates he recommends three steps, in line with the recommendations of *Water Works Practice*.

Discussing the above, Thomas L. Amiss considers that a reasonable estimate of the amount chargeable to fire protection is 10% of total

revenue. Charles H. Capen agrees with this, although he thinks the cost of fire protection is usually above 12-15% of gross revenue. He opposes the service charge and favors a minimum charge.

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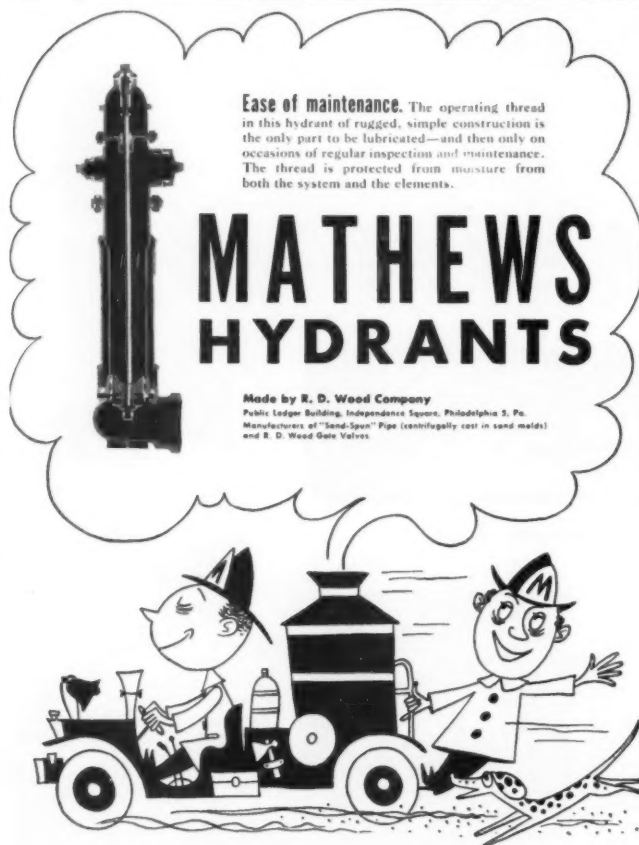
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Controlling Filter Flies

(Continued from page 39)

Chem-Larv was also tried out on the Worcester, Mass., filters. There are 16 filters, each 176 ft. in diameter, with a stone depth of 6 ft. The rate of application of sewage to these filters, based on an average flow of 33 million gallons a day and a filter content of 52 acre-ft. of filters, is lower than that at Ridge-wood—about 0.6 mg an acre-foot per day. Because of this low rate, the initial application of Chem-Larv was set at 20 gallons, or 3.84 pounds per acre-foot. This appeared to be too low, and control was obtained for only 7 to 10 days. On this



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basis, it is believed that the rate should be increased to at least 8.75 pounds per acre-foot. On low-rate, more heavily loaded filters, the application should be about twice as great as this, that is, 16.7 pounds or 1.67 gals. of the insecticide per acre-foot.

The recommended application for high-rate filters is 8.75 pounds per acre-foot, and for low rate filters 16.7 pounds. However, sewage treatment plants vary so greatly in many important characteristics—strength of sewage, volume applied per acre-foot of bed, depth of bed, and, in high rate filters, the method of recirculation—that these dosages should be considered as a starting point at which effective control will usually be obtained. However, it will always be desirable for each plant to carry on some experimentation in order to find the most effective rate and frequency of application for control.

Air Pollution Control

(Continued from page 48)

The cooperation of the citizens enabled the anti-pollution officer to check each complaint separately and work out a solution for the individual.

Through the use of forms published in the Kingsport Times-News listing such things as type of fuel used, hot water heater, cook stove, other fuel burners, etc., the director was able to expedite the handling of individual cases.

After Director Scrugg's resignation, J. C. Kimbrough, an authority on air pollution control, was appointed to the post of Director Of Air Pollution Control.

Continuing the work Mr. Scruggs had started, Director Kimbrough again mailed card forms to the residents of the city to serve as a cross-check on the work that had been done up to that time.

Even though the city had advanced far in clearing the air of dust and smoke, there were still days when it seemed as if no progress had been made.

On September 20, 1949, about 5 p.m., thick, black smoke began pouring out of the smokestacks at the Mead Corporation, from which up to that time only thin wisps of white smoke had appeared. It seemed at the moment the million and a half dollars the company has spent to eliminate smoke from its plant had been spent in vain. Wind, about the height of the smokestacks, blew the clouds directly over the residential section of the city.

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Newcomers to the city and others who had forgotten how bad conditions used to be became alarmed. Some thought there must be a serious fire; others thought another Donora, Pa., tragedy was impending.

In one hour, the Kingsport Times-News received over 150 calls from residents in the affected areas. Some complained they were choking on smoke and many complained of headaches.

A. S. Wells of the Mead Corporation later explained a temporary failure of part of the new equipment had caused the trouble. The new furnace was not in use over the week end before and when operation was resumed, electric precipitators did not take hold immediately.

The situation was soon cleared up after a warning had been issued by Commissioner Kimbrough.

Even though the incident was a minor one, it proved a point. The smoke thrown out by the Mead Corporation was only a small part of that which covered the whole city before the anti-pollution ordinance went into effect. The people had meanwhile become accustomed to breathing fresh-air—not smoke. Even a partial change back to the situation as it was in 1947 almost threw them into a panic.

A fine levied in Kingsport's City Court on the Pennsylvania-Dixie Corporation resulted in a second test case which was carried to the Tennessee Supreme Court. The cement corporation had been the subject of much discussion since the control law went into effect. The plant is located only a short distance from the downtown area of Kingsport, and from the main streets one can see the clouds of dust pouring from the plant.

In May, 1949, officials of Penn-Dixie appeared before the board of mayor and aldermen and requested a three-year grace period before complying with the ordinance. Spokesmen said then a new plant was planned nearby in Southwest Virginia and the Kingsport plant would be closed when the new factory was completed. Until that time, they asked to be excluded from the law. The request was denied. Plant officials then went to work on plans for filtration units for the factory.

On December 18, 1949, the Supreme Court of Tennessee upheld the constitutionality of Kingsport's Dust and Smoke Control Law.

The decision handed down by

Tennessee Supreme Court Justice A. B. Neal, also confirmed the conviction of Robert Dolan, a Kingsport coal dealer, fined for selling fuel for hand-firing of other than that specified in the city ordinance.

In his opinion, Justice Neal said, "contention had been made by counsel for the defense that the ordinance prohibiting excessive smoke expulsion is an invalid exercise of the police power, since the city charter is silent as to the abatement of smoke.

"The ordinance is valid, we hold, in that the police power extends to the promotion of public safety and general welfare by regulating all things harmful to the comfort, safety, and welfare of the public.

"In as much as a preservation of public health and safety of inhabitants is one of the chief purposes of local government, all reasonable ordinances in this direction have been sustained."

On April 25, 1950, Penn-Dixie announced they would build the world's largest wet-process kiln to replace all dry kilns now in operation.

Victor N. Roadstrom, chairman of the board of directors, said the new kiln would reduce the amount of dust discharged in the air in 24 hours to 2.6 tons at maximum operation.

Air Pollution Control Director Kimbrough had estimated the plant threw out from 90 to 160 tons of dust per day before installation of dust collection devices began. This new kiln would thus greatly reduce the dust emitted.

As far as the smoke problem, the only violators now are at the individual homes. Last summer, Clinchfield Railroad moved diesels to Kingsport and will only use that type of engine inside the city limits. With that correction, all industrial and commercial firms are now abiding by the ordinances.

All installation of boilers, furnaces, stokers, oil burners, stacks or other combustion devices must be approved by the Department of Air Pollution Control. Each applicant must fill out a form supplied by the department and then must abide by the regulations. Each new device is inspected by a department officer after installation.

Director Kimbrough says if Kingsport can keep illegal dealers of high volatile coal out of the city, then the smoke-dust problem will be eliminated by April, 1951—when current dust control installations will be completed.

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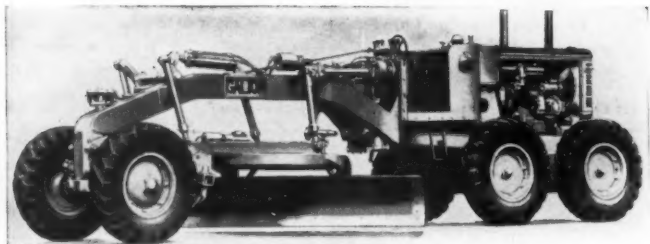
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Heavy motor grader by Galion.

New 100-HP Galion Motor Grader

This new Galion motor grader has a constant-mesh type transmission, with six speeds forward and two reverse; reverse speed is exceptionally high to save time when restricted conditions do not permit turning. The engine is diesel, 100 hp.; drive is 4-wheel tandem; weight is 23,560 pounds and up, depending on extra equipment. Only one lever is needed for shifting all gears, forward or reverse. Full data from Galion Iron Works & Mfg. Co., Galion, O., or by using the coupon.

Use coupon on page 81; circle No. 1-1

Water Energized Chlorination for Small Installations

In this equipment, the main supply line pressure furnishes operating power, a part of the flow being diverted through the unit, which is called "Surechlor." This small chlorination device is especially adapted to stand-by uses, to small installations and to disaster relief. Data from Paddock Engr. Co., Dallas, Texas, or use the coupon.

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Autograph Records Telephone and Radio Reports

This device provides voice recording of telephone, radio or other similar communications. It is used in municipal fire departments for

automatically recording calls reporting fires, and its use insures against incorrectly transcribed addresses. It can be used in the same way for recording radio calls from snow fighting apparatus, water or street department equipment that is radio-equipped, and for nearly all similar purposes. It is also used on police radio. Full information on this useful attachment from The Gamewell Co., Newton Upper Falls 64, Mass., or by using the coupon.

Use coupon on page 81; circle No. 1-3

Giant and Medium Weight Rollers

Pneumatic rollers are illustrated and described in "New Trends in Compaction" which cover rollers from 7 to 50 tons in weight. Tamping rollers are available in six medium weight models and four giant weight models. Foot pressures on the M

(medium) models range from 108 to 315 psi; and on the G (giant) models, from 296 to 740 psi. A copy of the booklet can be obtained from Wm. Bros Boiler & Mfg. Co., Minneapolis 14, Minn., or by using the coupon.

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This Way Out

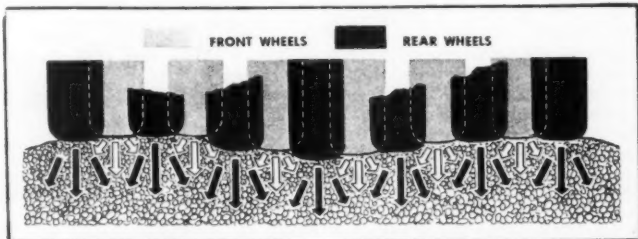
This automatic emergency exit light will assist in the safe evacuation of any premises if the regular current should fail. Under normal conditions, it operates like any exit light; but if current fails, this exit light will operate instantly and automatically from batteries furnished within the light. It also provides a powerful downward beam to illuminate the floor. It will furnish 8 hours of emergency light. More data from Electric Cord Co., 30 Church St., New York 7, N. Y.

Use coupon on page 81; circle No. 1-5

Plastic Pipe Fittings

Ells, tees and couplings are now available for use with the Carlon threadable rigid plastic pipe. These are molded from a single piece of thermo-plastic material and are proof against electrolytic corrosion, rust and decay. Data on sizes and other characteristics from Carlon Products Corp., 10127 Meech Ave., Cleveland 5, O., or by using the coupon.

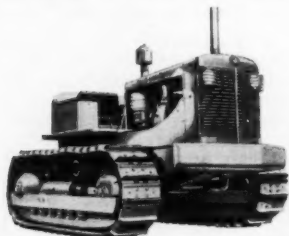
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How compaction occurs with pneumatic rollers.

New A-C Tractors and Attachments

Two new Allis-Chalmers tractors have been announced—the HD-9 and the HD-15. The HD-9 weighs 18,500 pounds and has a drawbar 70 hp; the larger HD-15 weighs 27,500



Allis-Chalmers HD-9.

pounds and has a drawbar 102 hp. Both have six forward and three reverse speeds. Both use GM 2-cycle diesels. Separate catalogs may be obtained from Allis-Chalmers, Tractor Division, Milwaukee 1, Wisc., or by using the coupon.

New bulldozers, graders and root rippers for the two tractors are also available, in both engine-mounted hydraulic and cable control models. Complete information on these are available from Baker-Allis-Chalmers dealers, from Baker Mfg. Co., Springfield, Ill., or by using the coupon.

Use coupon on page 81; circle No. 1-7

Lining Small Diameter Pipe Lines in Place

A cement mortar lining for water, gas and oil pipe lines 4-inch and larger is now available. Lining can be carried out on pipe lines in place. The pipe is first cleaned thoroughly; then a smooth cement mortar lining is applied. The equipment used is portable and is handled by special



Pipe lining outfit.

trucks so that any type of location can be handled. A descriptive booklet and complete information are available from The Centrline Corp., 140 Cedar St., New York 6, N. Y., or by using the coupon.

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Single Tank Deionizer Gives Mineral-Free Water

This single tank deionizer, which uses two types of resinous zeolite exchangers, produces water that is freer from impurities than distilled water—and much lower in cost. In addition, this unit will remove com-

pletely silica and CO₂. One of the exchangers is for cations, the other for anions, and these two are intermixed in a single tank; the different density permits them to be separated into two zones by backwash, permitting proper regeneration. Full data from Elgin Softener Corp., Elgin, Ill. or by using the coupon.

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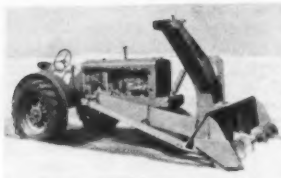
Please send catalog with complete details and specifications for the Mobil-Sweeper.

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Cleans walks quickly.

ways, load snow into trucks, or blow it to either side. Drive is from the tractor belt pulley and controls are hydraulic. It is claimed to be exceptionally useful for street and

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Use coupon on page 81; circ's No. 1-10

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This rotary snow plow is adaptable to Caterpillar and Allis-Chalmers motor graders; it is shipped in package form with all controls, hitches and assemblies, ready for mounting. It cleans close to the ground, has full circle casting controls and wide plowing ability. Drive



Rotary for motor grader.

is by a separate engine. This unit will not fit some of the older graders. For information, send your grader serial number to Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn., or use the coupon.

Use coupon on page 81; circle No. 1-11

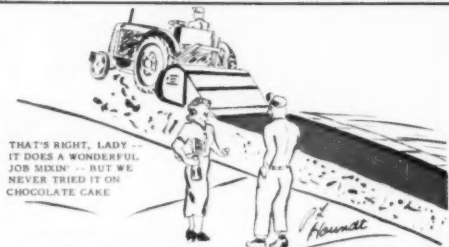
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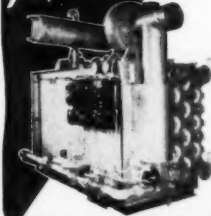
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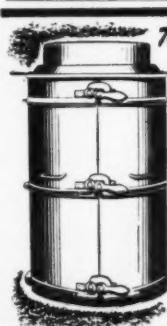


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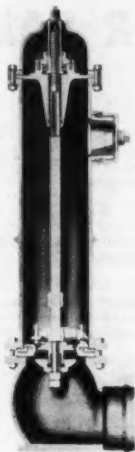
For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell and pipe at lowest cost.

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Ball Bearing Hydrant Has Advantages

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Darling hydrant.

tion of stuffing box and packing gland; and (c) reduced maintenance and service requirements. It is further said that the result is a dry head hydrant, with the possibility of water reaching the operating threads precluded. Bulletin 5007 contains complete descriptive information. Write Darling Valve & Mfg. Co., Williamsport, Pa., or use the coupon.

Use coupon on page 81; circle No. 1-12

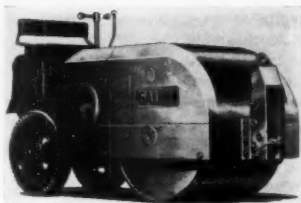
New Air-Controlled Excavators

These completely new $\frac{3}{4}$ -yard excavators—the General Models 310 and 312 and the Mobilcrane Model 315—have many features usually classed as extras. The 310 is a crawler mounted shovel, dragline, clamshell, crane and hoe, and all basic motions are controlled by air. The 312 is truck-mounted and is available as shovel, crane, clamshell and hoe. The Mobilcrane, to be mounted on pneumatic tires, is not yet in production. Additional data now on the 310 and 312 from General Excavator Co., Marion, Ohio.

Use coupon on page 81; circle No. 1-13

New Galion Portable Roller

Compression under the roll of this new portable is 130 pounds per inch of roll width; when 2,300 pounds of water are added, compression is 192 pounds per inch of width. Compres-



Galion portable roller.

sion roll is 42 ins. wide and 48 ins. diameter. Steering is by hydraulic control. The roller is fitted with mats and sprinkling equipment.

Complete data from Galion Iron Works & Mfg. Co., Galion, O., or by using the coupon.

Use coupon on page 81; circle No. 1-14

30-Ft. and 105-Ft. Portable Compressors

A new 30-ft. portable air compressor, with a maximum operating pressure of 150 lbs., is available either as a trailer model or a hand truck model. An improved 150-ft. portable air compressor, lighter, lower and more maneuverable than the former model, is also announced. Both are produced by and data are

Another outstanding Smith-Blair product . . .

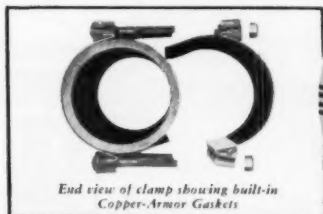


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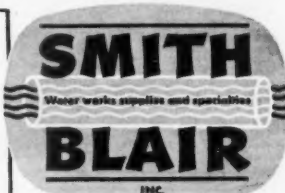
Here's a clamp so simple that field emergencies have proved it can be installed under water and under 85 pound pressures by "feel" alone! Its matched copper-armor gaskets go right into proper position without coaxing. And it assures a complete shut-off of leaks on the first tightening of the clamp. The Smith-Blair Full Circle Clamp is unsurpassed for quick, economical, permanent leak repair service. Write for bulletin today, or see your nearest Smith-Blair Distributor.

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Write for name and address of nearest Smith-Blair Distributor.



End view of clamp showing built-in Copper-Armor Gaskets

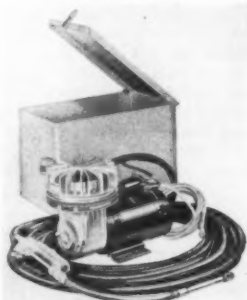


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available from Worthington Pump & Machinery Corp., Holyoke, Mass.; or use the coupon for obtaining information.

Use coupon on page 81; circle No. 1-15

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Cutting pavements and compacting trenches are only two of the many jobs this self-propelled hydra hammer can do. It travels under its own power at 12 mph and is ready to go to work as soon as it reaches the job. It is claimed that one hammer will cut more asphalt surface than two men with conventional tools and tamp as much backfill as



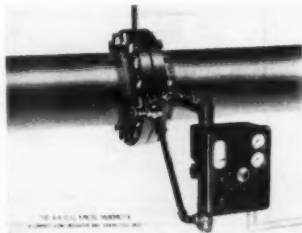
Cuts and compacts.

four men. It will compact a 4-ft. wide trench, without moving the wheels. Full data from Ottawa Steel Products, Inc., Industrial Division, Ottawa, Kans., or by using the coupon.

Use coupon on page 81; circle No. 1-16

The V/A Cell for Measuring Flows

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the flow range is very simple. Full data from Fischer & Porter Co., Hatboro, Pa., or by using the coupon.

Use coupon on page 81; circle No. 1-17

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A clear and transparent material is now available which, when sprayed on or brushed on, is claimed to prevent water penetration through cement or cinder block, brick or concrete walls, even under most severe storm conditions. It is said to penetrate deeply, seal all cracks, even hairlines, and expand to fill all pores in the material. It is resistant to acid and alkalis. Full data from Dasco Co., Inc., 1602 Thames St., Baltimore 31, Md., or by using the coupon.

Use coupon on page 81; circle No. 1-18

2-Cylinder, 4-Cycle Diesel

With a speed range of 1200 to 1800 rpm, this 20 to 30-hp diesel engine is designed for light and power generating sets; shovels, cranes and magnets; sand and gravel plants; standby service and pumping. The engines are 2-cylinder, 4-cycle. Full data from Nordberg Mfg. Co., Milwaukee 7, Wisc., or by using the coupon.

Use coupon on page 81; circle No. 1-19

PERSONAL NEWS

Col. Jack J. Hinman, Jr., who, as Visiting Professor of Sanitary Engineering, has been substituting for Prof. H. G. Baity at the University of North Carolina, returned to his usual activities in Iowa shortly before Christmas. Prof. Baity has been on duty outside of the country.

Associations & Meetings

The British Industries Fair will be held from April 30 through May 11. Heavy industry will be centered at Birmingham, England, and other categories will be on show in London. Information from British Info. Services, New York 20, N. Y.

The New Jersey Sewage and Industrial Wastes Ass'n. will hold its 36th annual meeting at the Haddon Hall Hotel, Atlantic City, March 14 to 16. Michael S. Kachorsky is Secretary-Treasurer.

Examinations for operators' certification for water and sewage treatment will be held April 27 in five cities in Ohio. For details write G. A. Hall, 301 Ohio Dep'ts. Bldg., Columbus 15, Ohio.

Fluoridation Results at Lewiston, Idaho

Fluoridation of the Lewiston, Idaho, water supply was initiated three years ago. Results of this program are reported in the latest Lewiston annual report as follows: (1) The decayed rate for 7-year old children has been reduced from 1.4 teeth in 1947 to 0.6 tooth in 1950. (2) The decayed rate for 8-year old children has dropped from 2.6 to 1.7 teeth. (3) The decayed rate for 9-year olds has dropped from 3.7 to 2.8 teeth.

Enterococci as Sewage Pollution Indicator

During extensive surveys of Lake Michigan in 1947 and 1948 by the Sanitary Water Board of Illinois, under leadership of Bacteriologist R. N. Scott, the procedure for determining enterococcus bacteria was adjusted for use as a corroborative test to the well-known coliform test. Enterococci are always present in domestic sewage and generally are absent when there is no trace of domestic sewage; and according to early conclusions, this new test may be a more reliable indicator of recent sewage pollution than the coliform test.



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Tapping Prestressed Concrete Pipe Under Pressure

42. An attractive bulletin is offered which shows, in step-by-step pictures and simple instructions, the procedure for tapping prestressed concrete steel-cylinder pipe under pressure. Both small and large diameter connections are considered. Use coupon to send for your copy. Price Brothers Co., 1767 East Monument Ave., Dayton 1, Ohio.

Modern Power Plants Need Diesel Economy

43. Baldwin Series 700 diesel engines are described in a new bulletin, No. 320, just issued by the Baldwin-Lima Hamilton Corp., Philadelphia 42, Pa. These engines are four-cycle with a 17-inch bore, 20-inch stroke, 237 to 375 rpm. Horsepower ratings range from 710 hp. to 2,080 hp. Check coupon now for full data.

Engineering Data on Diatomite Filters

44. Detailed information and typical plans of Sparkler diatomite filters for swimming pools of municipal water systems is available to engineers and municipal officials. These filters feature self-cleaning filter elements which cuts wash water to a minimum. Get this material now by using coupon. Sparkler Manufacturing Co., Mundelein, Ill.

Manual of Welding Engineering and Design

51. In a new manual compiled by Eutectic Welding Alloys Corp. the art of welding in all its phases is discussed, with particular emphasis on the techniques that are helpful in these days of impending material shortages. This 48-page book includes data on properties and characteristics of "Eutectic" alloys and fluxes. Available without charge. Just check the coupon. Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.

Helpful Data on Swimming Pools

52. Data on injector nozzles for complete recirculation, fittings for correct drainage and other useful information for pool design are covered in Manual SP issued by Josam Mfg. Co., 335 Josam Bldg., Cleveland 13, Ohio.

Check Your Power Needs Without Delay

64. International Harvester Company has available a new folder describing its line of diesel engines and power units for all your power needs up to 180 hp. For a copy of this colorful booklet, write to International Harvester Co., 360 N. Michigan Ave., Chicago 1, Ill., and ask for Form A-256-NN, or use the handy coupon and we will forward your request.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Corrosion-Resisting Paints for Water and Sewage Plants

74. "Chlorclad", a corrosion-resistant rubber base paint, is said to have excellent adhesion to all surfaces without primer; durable under ordinary traffic conditions, not affected by continuous immersion in water. New product data sheet will be supplied by Carboline Co., 7603 Forsyth Blvd., St. Louis 5, Mo. Just check the coupon.

Highway Spreaders For Every Use

84. Do you prefer a trailer type spreader, one driven with truck power take-off, or a complete motor-driven unit? All three types are offered by Highway Equipment Co., 630 D Ave., Cedar Rapids, Iowa, for spreading all ice control materials, sand or chips, crushed rock. New bulletins cover all models to help you select the one best suited to your needs. Use the coupon for your copies.

Cement Lining for Smaller Diameter Water Lines

89. Water lines from 4" to 12" diameter are now cement-lined in place by Centrline Corp., using the Tate process. Catalog C-50 tells how this operation gives new pipe performance to old lines, and shows just how the work is done. An interesting folder, well worth studying. Check coupon for your copy. Centrline Corp., 140 Cedar St., New York 6, N. Y.

"10 Questions to Ask a Diesel Engine Salesman"

91. A new 28-page booklet with this provocative title is being offered by the Murphy Diesel Engine Co., 5317 W. Burnham St., Milwaukee 14, Wis. The book asks and answers ten questions pertaining to diesel engine design and gives full mechanical details on the Murphy Diesel line of engines. For your copy check the coupon.

Data on Pneumatic Gauges For Water Works

97. Be sure to investigate pneumatic water works gauges of the type used in many of the nation's most modern water treatment plants. Data offered in Bulletin 285-G1 describes pneumatic transmitting and receiving units, their applications, the summation of several flows, and other features. Typical filter control installation is diagrammed. Check the coupon or write Builders-Providence, Inc., 345 Harris Ave., Providence 1, R. I.

Your Laboratory Needs Reliable Equipment

123. Laboratory apparatus and chemicals: incubators, microscopes, pH meters, water stills, stirrers, turbidimeters, etc. can be obtained from any of the six branches of the Harshaw Scientific Div. of the Harshaw Chemical Co., Cleveland 6, Ohio. Use the coupon to get your catalog covering full line of water and sewage plant laboratory supplies.

What You Should Know About Tricking Filter Underdrains

124. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Tricking Filter Floor Institute, 327 Fifth Ave., Pittsburgh 22, Pa. Check the coupon and we will forward your request.

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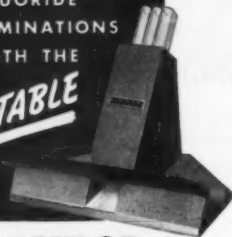
New Products, Pages 74-78:

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Something Different! "Pipe Dreams" Full of Fun and Good Sense

22. The Universal Concrete Pipe Company will be glad to send you regular issues of "Pipe Dreams", their delightful pocket-size magazine full of American philosophy and good cheer. No cost or obligation. Just write Universal Concrete Pipe Company, Dept. PW, 297 South High St., Columbus 15, Ohio.

How to Keep Trenching Jobs on Schedule

24. The easy maneuverability of the tough, compact Cleveland Model 95 "Baby Digger" makes it well suited for the difficult job of trenching past the many obstacles of city and suburban work. Multiple digging and crawler speeds handle all soil types and trench widths up to 24". Get Bulletin S-32 from Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Do Your Water Mains Need Cleaning?

38. Literature on flexible method of cleaning water mains any size from 2" to 72", giving full details and list of nearest representatives in all parts of country. Address: Flexible Underground Pipe Cleaning Co., 9059 Venice Blvd., Los Angeles, Calif.

Data on Modern, High-Rate Water Treatment Plant

40. This handsome 28-page bulletin gives a comprehensive yet understandably written story of the development of the Accelerator, and explains its principles, advantages, design considerations, operation and applications. Helpful flow diagrams and specifications. For a copy use the coupon or write Inflico Inc., Box 5032, Tucson, Ariz. Ask for Bulletin 1825.

Eliminate Taste and Odor From Your Water

53. Technical pub. No. P.W. 213 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with Break-Point Chlorination. Sent free to any operator requesting it.

Chem-O-Feeders for Automatic Chemical Feeding

60. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation, treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioners, Inc. %, P. O. Box 1342, Providence 1, R. I.

Improved Clarification with Carter Circular Collectors

61. Latest 16-page bulletin on water and sewage equipment, No. 4906, gives complete data and specifications on Carter's three different types of clarifiers. A valuable working guide for every sanitary engineer. Ralph B. Carter Co., Dept. PW, 188 Atlantic Ave., Hackensack, N. J.

Cast Iron Pipe and Fittings For Every Need

65. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-de-lavand centrifugally-cast and pit-cast pipe, bell-and-spigot, U, S, Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Dept. PW, Burlington, N. J.

96 Page Book Helps Solve Water Problems

71. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. A 96 page booklet. W. A. Taylor & Co., 7304 York Road, Baltimore 4, Md.

PUBLIC WORKS for January, 1951

Turbidity, Color and Hardness Removal

77. Modern water pre-treatment with Dorr equipment and methods is described in Bulletin No. 9141, which gives basic design data and flow-sheets for pre-treating highly turbid water, color removal or treatment of low turbidity, and softening. Typical analyses for various types of waters are given together with detention times in recommended treatment units. Write The Dorr Co., Dept. PW, Barry Pl., Stamford, Conn.

Installation Guide for Transite Pressure Pipe

192. A convenient, pocket-size book of 115 pages covers the whole job from receiving and handling pipe to pressure and leakage tests of finished lines. Over 100 drawings show important operations, and the text tells both how and why. Copies are available from Johns-Manville, Dept. PW, 22 E. 40th St., New York 16, N. Y.

Pressure Pipe That Retains Capacity

104. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

How Short Coupled Turbine Pumps Are Used

125. Ease of installation and dependable service make short coupled vertical turbine pumps particularly desirable for many municipal pumping jobs. Bulletin SCP-50 shows application of Layne pumps for lake and river intakes, fire pumps, drainage, pipe line boosters and many other uses. Check coupon for your copy of this valuable booklet. Layne & Bowler, Inc., Memphis 8, Tenn.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2½" to 14½" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydracore Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

How Elevated Water Tanks Can Save on Operating Costs

134. Beautiful new booklet on Horton elevated steel water tanks suggests ways to reduce pumping costs, increase capacity of systems, maintain uniform pressure, etc. Illustrates 7 models of welded, ellipsoidal-bottom, elevated steel tanks in full color. Write Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

Helpful Data on Mechanical Joints

139. Get Circular 49 from M & H Valve & Fittings Co. for important information and installation dimensions of M & H AWWA Mechanical Joint Valves and Hydrants. Features include ease of installation, construction economy, long life. Use coupon or write M & H Valve & Fittings Co., Anniston, Ala.

Complete Equipment for The Complete Pool

157. Latest equipment for recirculation, filtration, chlorination, softening and pH control are described in Permit No. Bulletin No. 2157. Manual and automatic valves explained and many installations diagrammed. Complete specifications given. Permit Co., 330 West 42nd St., New York 18, N. Y.

What You Should Know About Meter Setting and Testing Equipment

144. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Handy Catalog Covers All Pipe Repairs

147. A complete catalog covering repair clamps, packings and gaskets of several designs to suit all needs is offered by the Smith-Blair Co. Directions for use show ease of application. Every water works needs a copy of this catalog for ready reference. Available by using coupon or writing Smith-Blair, Inc., So. San Francisco, Calif.

Handy Calculator for Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

How To Stop

Water Hammer Damage

99. Water hammer and pipe line surges can be controlled, and damage to pumps, valves and fittings avoided by installation of "Fluidynamic Desurgers" at strategic points. These devices are available in standard pipe sizes, and may be installed in existing lines or new construction. There is no resistance to normal flow through the desurger. Full engineering information by checking coupon. Valve Equipment and Development Co., 30 Rockefeller Plaza, New York 22, N. Y.

CONSTRUCTION EQUIPMENT

Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

Handbook of Contractors Pumps Is Easy to Use

49. Big 50-page Catalog P-10 covers de-watering pumps, pressure pumps, well points systems and electric pumps, and also features a special section of useful data which helps in the selection of the right pump for your job. Every construction engineer and contractor should have a copy of this valuable handbook. Just check the coupon. The Jaeger Machine Co., Dept. FW, Columbus 16, Ohio.

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular advertising new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis.

Your Property Is Worth Good Protection

176. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Koniak" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

Helpful "How To Use" Section Aids Roller Selection

192. In addition to specification and illustrations of roller operation, the new Buffalo-Springfield catalog features a special section to help in the selection of the right roller model for the job. Be sure you get top results from your roller selection by checking this helpful material. Use the coupon for a copy, Buffalo-Springfield Roller Co., Springfield, Ohio.

Versatile Wheeled Tractor Handles Countless Jobs

204. A new booklet on industrial wheeled tractors recently published by The Oliver Corp.

covers the complete Oliver line. Many application photos show use of tractors with matched allied equipment such as bucket loaders, maintainers, plows, mowers, brooms, etc. Get this bulletin, Form A-918, from The Oliver Corp., 19300 Euclid Ave., Cleveland 17, Ohio.

Self-Priming Trash Pumps Work "High and Dry"

205. The maintenance difficulties of submerged trash pumps is avoided in the new non-clogging, self-priming trash type sump pumps described and illustrated in Form 9-ST-11, issued by The Gorman-Rupp Co., Mansfield, Ohio. Performance curves and specifications are included.

SEWERAGE AND WASTE TREATMENT

Packaged Sewage Treatment—Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. F.W., Adams, Mass.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. FW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

Standard Forms for Concrete Pipe

67. Concrete pipe for sewerage, drainage and culvert projects can be produced quickly and uniformly with Quinn Standard concrete forms. Data on forms for 12" to 84" tongue and groove or bell end reinforced pipe from Quinn Wire and Iron Works, 1621 12th St., Boone, Iowa.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co. Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

Get This Data for Your Laboratory

119. "Water and Sewage Analysis," a 32-page booklet, describes and illustrates equipment for making convenient and accurate water and sewage analyses, including comparators, aqua testers and turbidimeters. Hellige, Inc., 3718 Northern Blvd., Long Island City 1, N. Y.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connersville Blower Corp., 511 Poplar Ave., Connersville, Ind.

Check "Gunite" Concrete For Every Application

158. Big 44-page book illustrates "Gunite" uses for both repair and new construction of sewers, tanks, dams, swimming pools, and all concrete structures. A multitude of applications. Be sure to check coupon or write Pressure Concrete Co., Dept. FW, 315 S. Court St., Florence, Ala.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Tigrit" washers, sludge collectors, feeders, conveyors

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Daytime view with two of the antiquated lamp posts formerly used to "light" the town (note the contrast to the modern Kerrigan Weldforged Standard on left).



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Chemicals for All Pest Control Work

199. Full data on dosages and methods of application of DDT, 2,4-D, BHC and other insect, weed and rodent control chemicals is available from Chemical Insecticide Co., 285 Van Brunt St., Brooklyn 31, N. Y.

Data Offered On Mixed Flow Pumps

201. Data on the complete line of Worthington Mixto pumps of the two-vane, non-clogging sewage type is offered in 16-page bulletin W-317-1116. Salient features are outlined, typical sections, performance curves and general data for five types are included. Helpful charts aid shafting selection. Copies available by using coupon or from Worthington Pump and Machinery Corp., Harrison, N. J.

Data on Design of Grit Collectors and Washers

202. Grit collection and separation of organic materials from settled grit is described in Link-Belt Bulletin 1942. Typical installations are shown, and design data is provided, together with specifications. Use coupon for copy, or write Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

How to Estimate Quantity Of Joint Compound Needed

229. Directions for using Atlas G-K Sewer Joint Compound plus a handy table quantity of compound and jute required per joint of sewer pipe are presented in Bulletin M20-1. Get full data on this permanent joint material from Atlas Mineral Products Co., 10 Pine St., Mertztown, Pa., or use coupon.

Vacuum Filters Feature Easy, Non-Clog Operation

241. Get full data on vacuum filters using double layers of continuous coil springs that insure continuous, non-clog operation for sewage sludge dewatering. Coils are automatically cleaned at each revolution. Komline-Sandersen Engineering Corp., Peapack, N. J.

SNOW FIGHTING

How to Select the Proper Sno-Plow for Your Truck

21. Fully illustrated 24-page catalog on Frink Sno-Plows includes valuable tables on proper plow and leveling wing selection for mounting on all size trucks. Detailed discussions cover special features which result in performance plus economy. Use coupon for copy. Frink Sno-Plows, Inc., Clayton, 1008 Islands, N. Y.

Spreaders for Ice Control Save Labor and Speed Job

28. Only the driver is needed to spread salt or abrasives for ice control when a Frink Tail-Gate Spreader is used. Hydraulically driven, fully automatic unit is controlled from the cab. Further details in bulletin issued by The Frink Co., Dept. 11-S, Streator, Ill. Use coupon today.

Two-Way FM Radio Telephone Equipment for All Departments

197. The benefits of two-way radio communication for all departments of municipalities and counties make full information on this subject important to all engineers. For descriptions of Motorola FM systems, or for specific recommendations concerning your application write to Dept. PW, Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.

Beat Back the Snow With "Caterpillar" Equipment

230. Good advice on meeting the problem of snow fighting is offered in illustrated stories in "Caterpillar's" new 16-page booklet that shows how City, County and State highway departments and road commissions meet the challenge. Be sure you are ready to keep traffic moving. Use handy coupon, or write Caterpillar Tractor Co., Peoria 8, Ill.

Thrifty Salt Spreader for Snow and Ice Control

248. Check to Tarco "Scotchman" for fast, thrifty salt application to icy roads. Stainless steel spreader has weatherproofed engine. Get all data from Tarrant Mfg. Co., Jumel St., Saratoga Springs, N. Y.

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Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wis.

REFUSE COLLECTION AND DISPOSAL

Efficient Material Handling to Reduce Incineration Costs

139. Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2247. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

How to Build and Operate A Sanitary Fill

144. A complete discussion of many types of sanitary fill construction, together with cost data from communities of all sizes, is offered by the Drott Mfg. Corp. Get this valuable presentation on the Drott Bulldozer and International Crawler tractor combination, specially designed for all phases of sanitary fill work, by checking the handy coupon, or write Drott Mfg. Corp., Milwaukee 8, Wis.

Investigate This Plan For Garbage Elimination

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposall units. Check the coupon now. Hotpoint Disposall Department, 5600 West Taylor St., Chicago 44, Ill.

STREETS AND HIGHWAYS

How the Mobil-Sweeper Can Improve Street Sweeping

23. Sweeping costs can be cut with the new Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

Get Data Now On This Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AA a full line of equipment for black top road construction and maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

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45. Automotive Hydra-Shovel digs 15 ft. above, 15 in. below grade, features independent hydraulic hoist and crowd action. Capacities 1 cu. yd. for digging solid earth, 1 1/2 and 2 cu. yd. for loading all types material. Get information from Dempster Brothers, Inc., 949 Dempster Bldg., Knoxville 17, Tenn.

Open Steel Mesh Pavement for Bridges

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Investigate These Street Lighting Standards

127. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards by using the handy coupon. Check these strong, well designed, yet inexpensive steel standards for practical street and highway lighting. Handsome folder also includes data sheets on floodlighting and area lighting standards. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept., PW, Warren, Ohio.

Road Widening With Concrete, Bituminous Mix or Gravel

149. All types of road building materials are handled quickly and accurately by Aspec Wideners. New illustrated bulletin shows operations on all types of widening strips, gives details on wideners and trench rollers. Issued by All Purpose Spreader Co., Elyria, Ohio.

Versatile Maintainer Has Year 'Round Usefulness

151. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

How You Can Improve Your City's Street Cleaning

162. The Austin-Western Model 4-sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2-yd. hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

Helpful Booklets Explain Road Construction Methods

177. Three booklets covering soil cement processing, macadam base construction and highway shoulder improvement are offered to engineers and officials in the public works field by Petzold Equipment Co., 590 5th Ave., Oswego, N. Y. Use coupon to request your copies.

Complete Bulletin on Municipal Supplies

178. Everything from leak locators to street signs is listed in the big bulletin on "Municipal Supplies" published by Darley. Hundreds of different items for all city departments are included in this handy booklet. Get a copy for ready references on all municipal supplies from W. S. Darley & Co., 2814 Washington Blvd., Chicago 12, Ill.

Useful Data for Highway Builders In Barrett Road Book

190. The latest edition of "The Barrett Road Book" has 54 pages of helpful tables and step-by-step outlines of highway maintenance and construction with Tarriva and Tarriva-lithic. Tables show quantities per yard and mile; aggregate gradings; costs; many others. Get this useful book from Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

How to Get Good Grass for Roadside Shoulders

193. For every step in lawn care and reasonable maintenance hints be sure to read "Lawn Care," an interesting periodical sent without obligation by O. M. Scott & Sons Co., 80 Spring St., Marysville, Ohio.

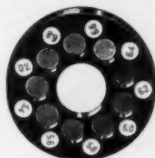
The Easier Way For Pavement Breaking

220. Rapid Pavement breaking the low cost way is described in bulletins issued by the R.P.B. Corp., 2751 East 11th St., Los Angeles, Calif. Both "Mighty Midget" and heavy-duty truck-mounted models make quick, clean cuts, break trench openings or tamp backfill. Use coupon for full data.

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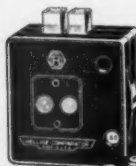
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Pollution of water supplies through plumbing back-siphonage has increased as a hazard to public health

EXCEPT

In this new, modern **MURDOCK Outdoor Drinking Fountain**. There are no cross connections between outside sources of pollution and water supply line.

Write for folder.

"It Pays to Buy MURDOCK."

The MURDOCK MFG. & SUPPLY CO.
Cincinnati 2, Ohio



MURDOCK

OUTDOOR DRINKING FOUNTAINS

HYDRANTS

STREET WASHERS

ANTI-FREEZING COMPRESSION HYDRANT

SELF-CLOSING ANTI-FREEZING HYDRANT



FOR OUTSTANDING LAWN BEAUTY...

it's **Scott's**

Parks, civic developments, and recreational areas with good lawns possess a magnetic popularity. The easy and economical way to provide your community with this outstanding lawn perfection is to use **Scott's LAWN CARE PRODUCTS**. Start your turf improvement program now by writing for our turf specialists' recommendations and prices. You'll also receive our **FREE LAWN CARE** bulletin service... no obligation, of course.

O. M. Scott & Sons Co.
50 Spring St., Marysville, Ohio
also Palo Alto, California

Scott's LAWN CARE PRODUCTS

WORTH TELLING ...

by **Arthur K. Akers**



● The Eastern Sales Office of **The Dorr Company** has been moved to the company's general offices in Barry Place, Stamford, Conn. A branch continues at 570 Lexington Avenue, New York.

● A voluntary allocation program for distributing equitably during 1951 heavy equipment manufactured by the **Caterpillar Tractor Company** has been set up. It includes at present track-type tractors, bulldozers, and motor graders.

● **E. L. Cline** (below) is the new western division manager of sales for **J. D. Adams Manufacturing Company**, Indianapolis; with responsibility covering the entire territory west of the Mississippi river, plus Wisconsin, upper Michigan, and some Illinois.



Mr. Cline



Mr. Shelgren

● **W. L. Shelgren** (above), **Dresser Manufacturing Division** specialist in problems of clamping B&S pipe joints, is celebrating his 25th anniversary with the organization. His youthful appearance is evidently due to his early start—as office boy.

● **Philip Kerrigan, Jr.**, president of **Kerrigan Iron Works, Inc.**, Nashville, Tenn., was lately elected to a three-year membership on the Southern Research Institute's Advisory Council.

● **Robert E. Owen** becomes district manager for the entire Southwest for **Gar Wood Industries**, Wayne Division, dump bodies, cranes, and Load-Packers. **Dwight L. Mink** has a like appointment for the Midwest Region.

● Add **Lock Joint Pipe Company's** new plants: they have just purchased from the Illinois-Wisconsin company their pipe plant in South Beloit, Wis., one of the largest producers of culvert and sewer pipe in the Midwest.

● **W. W. Black** is newly appointed chief engineer, Field Engineering Section, in **International Harvester's** industrial government

products group. Training operators and servicemen for specialized government vehicles produced by I. H. will be his job.

● The **Clay Sewer Pipe Association** has taken new offices in 311 High Long Building, Columbus, Ohio.

● **A. C. Daugherty** becomes manager of market research for the **Rockwell Manufacturing Company**, Pittsburgh, succeeding **W. A. Marsteller** whose resignation was announced last month. **W. F. Weimer** succeeds Mr. Marsteller as advertising manager. He has long been prominent in industrial advertising circles.

● **Worthington-Gamon Meter Company**, Newark, N. J., has these new officers: **Robert R. Anderson**, president; **William C. Flanders**, vice president, sales; **Walter H. Zeis**, secretary-treasurer.

● **C. O. Relephord** has become Los Angeles branch manager for Pump Division, **Byron Jackson Company**, removing there from the Houston branch.

● Purchase of the **R-S Products Corporation** of Philadelphia, manufacturers of butterfly valves, by **S. Morgan Smith Company**, York Pa., has been announced by **Beauchamp E. Smith**, president. Present management of R-S—**W. E. Borbonus**, president, and **D. W. Hopkins**, executive vice-president, remains unchanged. **Burwell B. Smith**, vice president, and **Duncan D. McArthur**, secretary, are added to the R-S board of directors.

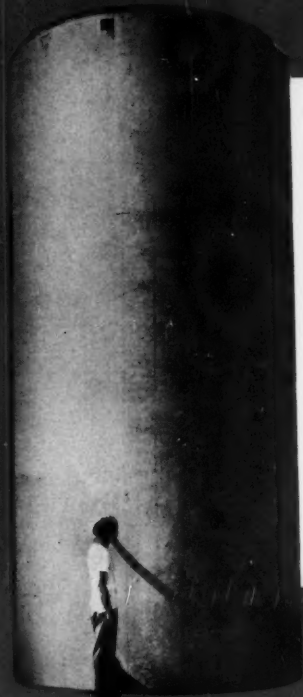


Miss Dimmers



Mr. Stewart

● **James G. Stewart** has been appointed manager of the Water and Sewage Works Manufacturers Association Inc., in place of the late **Arthur Clark**. **Miss Dorothy Dimmers** was appointed secretary of the Corporation.



*From mammoth
to midget...*

**according to
your requirements**

120" Lock Joint Reinforced Concrete Pressure Pipe
and 18" Lock Joint Reinforced Concrete Cylinders Pipe

Whether your daily water consumption demands be 3,000,000 gallons or hundreds of times that figure, Lock Joint Pipe Company is prepared to provide a supply line for your requirements.

In the last few years the Company has supplied not only hundreds of miles of large diameter pipe but also more than a million feet of 16" to 24" pipe for municipalities and industry. This has been made possible through the establishment of three permanent manufacturing plants. Lock Joint Concrete Pressure Pipe

from 16" to 42" in diameter, produced at these plants, can be shipped economically to all parts of the country—for both major installations and minor extensions.

Our representative will be glad to discuss with you any water supply or transmission project which calls for pressure pipe 16" in diameter or larger. You will find that Lock Joint Concrete Pressure Pipe's superior characteristics of long life, continuous high flow and negligible upkeep will recommend it above all others for any permanent water supply installation.

SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains in a wide range of diameters as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

LOCK JOINT PIPE COMPANY

Est. 1902

P.O. Box 869, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich.

BRANCH OFFICES: Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo.
Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan.
Kenilworth, N. J. • Hartford, Conn.

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

Fluoridation News

1945  1950

W&T ENGINEERS
401 First Street, Newburgh, N. Y.

WEALTHY #2
W&T ENGINEERS
401 First Street, Newburgh, N. Y.

Fluoridation has come a long way since that day in 1945 when W&T Engineers, in conjunction with health authorities, made the now so well known fluoridation installation at Newburgh, N. Y. At that time, fluoridation was in the experimental stage—was looked upon as a possible, though still to be proven, method of reducing the incidence of dental caries.

Now, however, fluoridation, through intensive research and development and through practical application in many W&T installations, has merited the endorsement of such organizations as the American Water Works Association, the American Public Health Association, the American Dental Association, the Conference of State and Territorial Dental Health Directors, and the Conference of State and Territorial Health Officers.

Accordingly, it is the announced policy of these and other similar organizations interested in the problem to approve the application of fluoride where such application is properly engineered, is under the guidance of qualified personnel and is recommended by the appropriate local professional groups.

Therefore, when *your* community is ready to look into fluoridation—and after you have consulted your State Department of Health—you'll find W&T Engineers ready and willing to help you. They can bring the following guidance to your problem.

1. Recognition of the fact that no two fluoridation problems are alike.
2. Facts and figures to help you decide which of the several ways of adding fluoride is most suitable for your needs.
3. The experience of over five years in the practical application of fluorides.
4. Data on what fluoridation can and cannot accomplish.
5. A full line of dry chemical and solution feeders tested and proved through years of operation and *known* to be suitable for fluoridation.
6. Over thirty-seven years' experience in the field of water treatment.

WISCONSIN

WALLACE & TIERNAN
COMPANY, INC.

CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

Today over 30 W&T installations in Wisconsin alone